SURVEY OF FIFTEEN PRINCIPALS TRAINED IN PRECISION TEACHING EXPLORING THEIR USE OF THE STANDARD CELERATION CHART

By

Ann H. Starlin
B. A., University of Oregon, 1965
M. A., University of Oregon, 1969

Submitted to the Department of Educational Policy and Administration and to the Faculty of the Graduate School of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Redacted Signature

Chairperson

Redacted Signature

Redacted Signature

Redacted Signature

Redacted Signature

Diss
1986
S727
c. 2

Dissertation Defended: July, 1986

ACKNOWLEDGMENTS

I thank Dr. Ogden Lindsley, whose guidance made it possible to undertake the study of this topic and for his continual influence on my profssional career; Dr. William Holloway, Dr. George Crawford, and Dr. Milo Stucky, who offered advice and support throughout my doctoral program; and Dr. Gary Clark for serving as an alternate on my doctoral committee.

In addition, I thank Dave Keller for conducting the principal and trainer interviews; Sheryl Mathis for her detailed editorial suggestions; Abigail Calkin for sharing information and offering advice; Snowdie Martin for continually encouraging me; Meredith Buenning for her timely support and assistance at the library; Pat All and Sandy Holloway for aiding with the graphics; and Loda Newcomb for typing and suggesting improvements in the text.

Finally, I thank Don Horner, who supported me throughout the entire process by understanding my challenge, offering encouragement, and providing his design and editorial expertise; and a special thank you to Drew Starlin, my son, for accepting my long hours of concentration on this project.

TABLE OF CONTENTS

LIST OF TABLES

Table | Page

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The second oldest professional position in the school system is the principalship (Kyte, 1952). The administrative duties and responsibilities associated with this position have multiplied so greatly that a principal must be highly trained in the skills required to carry out these tasks effectively.

The principal's task has been viewed primarily as one of improving the work of teachers (Mackenzie & Corey, 1954), improving instruction (Jacobson, Logsdon, & Eigman, 1973) and providing instructional supervision (Mangieri & Arnn, 1985). The principal is responsible for providing feedback to the teacher on the operation of the classroom and the instructional process and how it is perceived as needing or not needing change.

Today the principal is the prime architect of the plan by which student learning is to occur in the classroom. This is a change from the role of measuring process, i.e., teaching instruction; to a role of measuring product, i.e., student learning. This instructional leadership role requires an

understanding of the distinction between teaching and learning (Farley, 1985).

The instructional aspects of the classrom are not forgotten. The focal point is student learning. For example, whether or not the teacher increases the amount of praise given to students (so that praise is heard more frequently in the classroom) is not as great a concern as whether increased praise has a direct positive effect on student learning.

Precision Teaching is a system that provides direct monitoring through daily assessments of student learning. Through the use of this system, principals can draw a distinction between teaching and learning and bridge the gap between instructional leadership and learning leadership.

Need for the Study

Since the late 1960s, the Precision Teaching system has been used to monitor and improve student learning in a large number of both public and private schools. Albrecht (1984) estimates conservatively that 20,000 teachers have been trained in the techniques of Precision Teaching. The recent addition of training for administrators (principals in particular) has added a new focus to the system. In 1973, the principles of Precision Teaching were added to the curriculum in the Department of Educational Policy and Administration at the University of Kansas. This additional layer of training

potentially expands the impact on elementary and secondary students by increasing the number of trained administrators working with teachers. A need exists for a study to determine the extent training in Precision Teaching is put to use by school principals.

In a related study, Albrecht (1984) summarized ten major Precision Teaching projects in schools. Six of the ten projects were still active at that time. The results of the study implied that administrative support for charting is an important variable. In addition, Rawers (1983) interviewed teachers who implemented Precision Teaching and found they reported administrative support a significant factor in successful implementation. Teachers and administrators who report they are "comfortable" using the Standard Celeration Chart for professional as well as personal projects were found to have a strong commitment to Precision Teaching. Lovitt (1977) said that teachers who learn to chart and change their own behavior are better equipped to change student behaviors, both academic and social.

Purpose of the Study

This study explores the use of Precision Teaching by selected private and public school principals to determine the durability or staying power of the use of Precision Teaching by these school principals. This study surveyed selected

principals throughout the United States and one Canadian province regarding the instructional and administrative use of Precision Teaching at the building level.

Since the mid-1960s teachers have been trained in the techniques of direct and daily assessment of student learning, an inherent component of Precision Teaching. Albrecht (1984) reported that Precision Teaching has been applied in at least fifteen subject areas in public school and two academic departments at the college level. The Standard Celeration Chart, dominant in Precision Teaching, has also been used to monitor building supervision and change (Flanagan, 1982), maintenance of a special education program (Kunzelmann, 1972) and administrative behavior (Berquam, 1983; Calkin, 1984). Follow-up studies have been conducted on programs (Albrecht, 1984) and teachers (Beck, 1981; Rawers, 1983).

The intent of this study is to select a sample of principals trained in Precision Teaching (referred to as Precision Principals) and compare and contrast their continuing or discontinuing the use of the Precision Teaching system in administration and supervision of instruction. Variables and trends that characterize or lead to continuing or discontinuing the use of the Precision Teaching system by principals will be identified.

Since the early 1970s, principals and prospective principals have received training in Precision Teaching. Dr. Ogden

Lindsley began this practice when he moved from the Department of Special Education to the Department of Educational Policy and Administration at the University of Kansas in 1972. The techniques of Precision Teaching became an integral part of his course titled Supervision of Instruction. Some principals received their training through workshops or by becoming involved in federally funded projects such as SIMS through the Minneapolis School District or the Great Falls Precision Teaching Project. From 1967 to 1974, a five-day short course in Precision Teaching was conducted by the Behavior Research Company in Kansas City, Missouri, which provided another forum for training. While some received their training when employed as a principal, others received training prior to their professional employment as a principal.

Commitment to a measurement system such as Precision Teaching or commitment to an idea, method, or procedure in any field can bias or cause stereotyping and tunneled assessments of the real world. Precision Teaching is dynamic. People, singularly and collectively, can impact on the improvement of the technology and can affect the practices used in the instruction of Precision Teaching. A second component of this study is selecting a sample of principals who are not formally trained in Precision Teaching (referred to as Traditional Principals) who may or may not supervise teachers using Precision Teaching

in their classrooms. Their reactions to measurement in general and, specifically, the concept of Precision Teaching will be explored. Their estimates regarding their feelings about and future growth of Precision Teaching will provide an additional assessment of the reality outside of the Precision Teaching framework.

The last component of this study is the selection of a sample of Precision Teaching Trainers (referred to as Precision Trainers) who were asked for estimates regarding the outcomes of this study. Their estimates are compared to the actual reports of the principals.

Research Questions

Research questions to be answered by this study include:

1. How durable is the use of Precision Teaching in their principalship as reported by selected principals across the United States and one province in Canada who were trained in Precision Teaching?
    A. How many of the fifteen principals trained in Precision teaching, who were included in the sample, report that they have continued to chart or supervise charting?

2. What are the characteristics of the principals surveyed in this study?
   A. What are the general characteristics of the Precision Principals, Traditional Principals and Precision Trainers?
   B. What are the specific characteristics of the Precision Principals who continue charting?
3. What variables are related to continuing or discontinuing the use of Precision Teaching by selected Precision Principals?
   A. Is there a difference in the average celeration on charts reported by the Precision Principals who chart compared with those who discontinued charting?
   B. Does the date of training, type of training or position held by the principal during training differ when comparing principals who continue to chart and those who no longer chart?
   C. Is follow-up training related to continuing or discontinuing charting by principals who have been trained in Precision Teaching?

D. Is there a difference between principals who continue to chart and those who stopped when the number of charts and types of charts they keep or kept when they were charting are compared?

E. Is there a difference between principals who continue to chart and those who stopped when comparing whether or not they were rewarded, ignored, or punished by their superiors, families, or others?

4. How do principals feel and perceive others to feel about Precision Teaching?

A. Do principals who continue to chart feel more positive about Precision Teaching than those who stopped charting?

B. Are the perceptions reported by Precision Principals about how people react when they first learn about Precision Teaching related to the actual reactions of the Traditional Principals who are naive about Precision Teaching?

5. What do principals estimate will be their feelings if they were to be the principal of a school where there is a building-wide chart-based program?

A. Do principals who chart differ from those who stopped charting on how they would feel if they were principal of a building-wide chart-based program?

B. Do principals vary on their reactions as to how much content would be learned if their building had a chart-based program?

6. Have ideas changed, positions on issues been reversed, nonpersonal administrative or personal administrative behaviors changed or discoveries made as a result of charting?

A. Do principals who continue to chart make more discoveries from the chart than those who do not chart?

B. What do principals who continue to chart compared with those who stopped charting report about the number of positions that were reversed and the number of ideas that were changed by the chart?

C. Do more principals who continue to chart report that the chart has assisted them in personal or nonpersonal administrative changes than the principals who discontinued charting report?

7. How do Traditional Principals feel about the types of measurement that are currently being used in the classrooms of their buildings?
   A. Do Traditional Principals feel satisfied with the measurement that is currently being used in the classrooms of their buildings?
   B. What reasons for being dissatisfied with measurement currently used in the classroom will be given by Traditional Principals?
8. How do principals perceive the future of Precision Teaching?
   A. Do Precision Principals who continue to chart or those who discontinued to chart feel more optimistic about the future of Precision Teaching?
   B. Do Traditional Principals feel less optimistic about the future of Precision Teaching than Precision Principals?
9. How accurate are the estimates made by selected Precision Trainers when compared to the actual reports from Precision Principals?

Definitions of Terms

Precision Principal--A principal formally trained in Precision Teaching techniques. Training may have occurred prior to or during the time the person holds the position as principal. In this report, Precision Principals may be referred to as PP. PPc refers to those principals who continue to use Precision Teaching and are charting. PPn refers to those principals who do not continue using Precision Teaching and no longer chart.

Traditional Principal--A principal who has not been formally trained in Precision Teaching and may or may not supervise teachers who use Precision Teaching in their classrooms. In this report, Traditional Principals may be referred to as TP.

Precision Teacher--A classroom teacher using Precision Teaching. In this report, a Precision Teacher may be referred to as Pt.

Precision Trainer--A person whose primary responsibility is to train others how to use Precision Teaching. In this report, a Precision Trainer may be referred to as PT.

Traditional Teacher--A classroom teacher who does not use Precision Teaching. In this report, a Traditional Teacher may be referred to as Tt.

The remaining definitions, listed below, are taken from the Fall, 1982 issue of the Journal of Precision Teaching. The

section on "Standard Glossary and Charting Conventions" reports these are current definitions:

Frequency--The number of movements per unit of time.

Standard Celeration Chart--A standard, six-cycle semi-logarithmic chart that measures frequency as movements/time and celeration as movements/time/time; Daily, Weekly, Monthly, Yearly and Summary versions are available. The Daily chart is the most common version used in the classroom. In analysis the standard celeration chart may be referred to as SCC.

Celeration--Change in frequency per unit of time.

Acceleration--Increase in frequency over time, often described as X (times).

Deceleration--Decrease in frequency over time, often described as / (divide by).

Celeration Line--A best fit, straight line constructed through seven or more continuous frequencies of a given movement on the Standard Celeration Chart.

Learning Picture--The celeration lines of all movements being charted. Usually a two-line picture showing the relationship of one to the other.

Precision Teaching is a monitoring system that assesses behavior directly and may be charted on a daily, weekly, monthly and/or yearly chart. Three dimensions of measurement are basic to the system. They are: frequency, celeration and bounce

(variability) within the celeration course. All three dimensions are charted on the Standard Celeration Chart developed in 1967 by Ogden Lindsley and his students at the University of Kansas.

The most common use of Precision Teaching is the monitoring of student learning. In the classroom, daily practice or performance by students in various curricular areas within a certain amount of time is counted and converted to a standard frequency and then charted on the Standard Celeration Chart. These charted points form celeration lines and provide visual pictures called Learning Pictures (All, 1977). These Learning Pictures form the basis for decisions concerning whether or not certain interventions are appropriate for a particular student's program.

Precision Teaching charts can be used to monitor student learning, teacher effectiveness, program effectiveness and also the effectiveness of administration. Teachers and/or programs can be evaluated by aggregating data beginning with the learning of the individual student. The Standard Celeration Chart is used to display these data so an objective evaluation can be made. Building administrators can use data plotted on the Standard Celeration Chart as a basis for decisions that affect the instructional program for the building. Process data, such as charting the number of times teachers are praised and product data, such as charting the number of students who

have X2 or better learning per week, contribute information vital to effective administrative decisions.

CHAPTER II

REVIEW OF THE LITERATURE

The first part of this review focuses on the effective schools literature to determine how strong an instructional leadership role has been assigned to the principal and whether or not principals who perform that role have more effective schools. Part two identifies the components of a model of instructional supervision based on the principles of Precision Teaching. The third part of the review focuses on the highlights of other models of instructional supervision, any available data supporting their effectiveness, and the extent effectiveness is based on student learning.

Role of the Principal--Effective School Literature

The research on effective schools has been responsible for major educational reforms. The impetus for the effective schools "era" arose from reports such as the Coleman Report, which contended family background has more effect on the academic performance of poor and minority students than the school.

Since 1978, educators have become increasingly convinced that the characteristics of schools are important determinants of academic achievement. Edmonds (1979a) stated that asking

the question "Are there schools that are instructionally effective for poor children?" (p. 20) prompted the beginning of the effective schools search. The search grew primarily from studies such as Brookover and Lezotte (1977), Edmonds (1979b), Rutter (1979), and Weber (1971). Both effective and ineffective schools have been studied, and the conclusion derived from these studies is that effective schools share certain essential characteristics.

Edmonds (1982), a prominent figure in the search for excellence in schools, combined the findings of the Michigan Report (Brookover & Lezotte, 1977) and the California Report (Madden, Lawson & Sweet, 1976) in concert with his own research (1979a) and several others, into five characteristics of an effective school. He listed the characteristics as: (a) the principal's leadership and attention to the quality of instruction; (b) a pervasive and broadly understood instructional focus; (c) an orderly, safe climate conducive to teaching and learning; (d) teacher behaviors that convey the expectations that all students are expected to obtain at least minimum mastery; and (e) the use of measures of pupil achievement as the basis for program evaluation (p. 4).

Effective schools are characterized by a strong leadership component where the principal is actively involved in the education of the students (Austin, 1979; Brookover & Lezotte, 1977; Edmonds, 1979a). Studies have focused on how the principal

fulfills the leadership role in carrying out functions related to instruction.

Sweeney (1982) reviewed eight studies that met four criteria, i.e., internal validity control for pupil characteristics, effectiveness based on operational definitions of achievement, and significant positive relationships between school achievement and school leadership. He then asked the following question: "Do principals make a difference and if so, which leadership behaviors are associated with positive outcomes?" (p. 345). All eight of the studies reviewed found (a) the effective principals emphasize achievement, and (b) they set instructional strategies; seven studies found (c) the provision of an orderly atmosphere conducive to learning to be positively associated with effective schools; five studies found (d) frequent evaluation of pupil progress to be important; four studies found (e) principals who assume responsibility for coordinating the instructional program are more effective; and three studies found (f) principals who support their teachers in such areas as training, materials, and problem-solving, tend to have more effective schools.

In a review of several major studies comparing schools classified as "high achieving" versus "low achieving," "improving versus declining," Shoemaker and Fraser (1981) found four major factors characterized the principals of the more

effective schools. These were (a) assertive, achievement-oriented instructional leadership; (b) the setting and enforcement of clear, just and acceptable rules, regulations and guidelines; (c) having and communicating high expectations for staff and students, and (d) a focus on well-defined instructional objectives and a system for evaluating achievement. These four major factors match four of the six factors found in Sweeney's study of 1982.

Hager and Scarr (1983) reported on a professional growth program that increased principal efficiency and effectiveness in instructional leadership. Solutions provided for this change included a provision for additional secretarial time and a changed administrative structure that more clearly delineated responsibilities. The new structure allowed building administrators more time to perform critical functions necessary to make schools more effective and efficient. The principals were given more time to perform functions that demonstrate the seven characteristics of principals of effective schools as summarized by Benjamin (1981):

1. take initiative in identifying goals and priorities
2. hold themselves and staff personally accountable for student achievement
3. make instruction first priority, communicate and know programs

4. highly visible in classrooms and halls
5. care most about school's academic progress
6. handpick their staff and reward excellent teachers
7. set high expectations for staff and students

Wellisch, McQueen, Carriere and Duck (1978) examined the relationships between feelings, beliefs, and actions by principals and student learning. They found higher levels of pupil achievement in those schools where principals: (a) had strong feelings about the importance of instruction, (b) made sure their views on the importance of instruction were known by the teachers, (c) assumed the responsibility for "coordinating instruction," and (d) conducted regular reviews and engaged in discussions of instructional strategies used by teachers. While "coordinating instruction" was not defined, the implication is that it involves the principal assisting teachers in identifying and making needed changes in curriculum to enhance student learning.

Mangieri and Arnn (1985) surveyed 111 principals of schools that had been selected as effective under the United States Department of Education Secondary School Recognition Program. The principals were asked to rank order 17 dimensions of their job from most important to least important. The first, second, and third ranks were, respectively, instructional supervision,

evaluation of teacher performance, and curriculum development. The investigators stressed ranking job dimensions by what emphasis was actually given to a dimension rather than what emphasis should be given. While the degree of correspondence between "saying" and "doing" was not assessed, instructional leadership was at least ranked as a highly important dimension by the principals of schools recognized for excellence. However, the dimensions that would be ranked as receiving high emphasis by the principals of less than excellent schools is unknown and may have been the same. If this proved to be the case, other factors would have to be considered in accounting for excellence.

A review of the role of the principal as described by the effective schools research would be remiss unless some of the studies with less "effective" suggestions were reviewed.

In an article typical of many reviewed, Lemley (1983), a high school principal, looked to the management literature for suggestions that might enhance leadership skills and found 12. These included (a) being decisive; (b) supporting individual growth, success, and opportunity; (c) supporting those who are dedicated, creative, energetic, and loyal; (d) solving one problem at a time; (e) being persistent; (f) earning authority; (g) not assuming responsibility for all problems; (h) being effective first, then efficient; (i) abandoning the data if data conflict with common sense; (j) finishing one task

before beginning another; (k) recognizing that solving one problem may create another; and (l) planning ahead. The literature on how to improve effectiveness is replete with similar imprecise admonitions, precepts, and suggestions and is unlikely to serve as an effective guide to instructional leadership.

Another approach is to describe functions. Duke (1982) described what instructional principals should be doing in light of research on teacher and school effectiveness. He identified six leadership functions that were presumed to be related to instructional effectiveness. The four direct functions were (a) staff development, (b) instructional support, (c) resource acquisition, and (d) quality control. Two indirect functions were coordination and troubleshooting. Duke specifically selected functions over personality traits. These functions are not described in sufficient detail to permit the practical applications proposed by other authors of effective schools literature.

Still another approach is to rely on structure. Snyder (1983) divided the school year into three parts. In September and October, planning is considered the major instructional leadership function of the principal. Developing program and staff is the primary function from November through April with the focus during April and May shifting to evaluation. Those adhering to such a compartmentalized model would likely not find

Precision Teaching compatible with their efforts. The focus, on daily monitoring of student learning and rapid changes in instructional methods and/or content based on learning, must be ongoing throughout the school year. A principal who only begins to focus on evaluation during April and May and considers the Precision Teaching model (discussed in the next section) would find that it should have been implemented seven months earlier.

The above three authors provided theories rather than comparing effective schools with less effective schools. These theories appear less practical and most likely would be less effective than characteristics reported by authors who based their findings on data.

Finally, the national educational organizations have been affected by studies on effective schools. These organizations place a high value on the role of the principal. The National Association of Secondary School Principals Board of Directors (1983) scrutinized several national reports on American education. The board formulated a position paper that outlined its views on issues central to the concerns of principals and other high school and middle level educators. Responding to the role of the principal, the Board of Directors concurred with the reports that the principal's role is central to the quality of the educational program and that "the principal holds the key leadership role in achieving educational excellence" (p. 1).

The essence of the role of the principal is described by Smyth (1980), who, in a provocative article asked what would be the cost if all school principals were to "mysteriously disappear" (p. 1). He argued that in many cases it might not make a difference. The following quotation from the article is a powerful statement concerning the primary role of the principal:

> It shall be argued here that many schools are in need of "educational" leadership that relates directly to the instructional and teaching function of schools. Arguments to the contrary by principals, based on claims of alleged lack of time or inadequate expertise, in many instances amount to rationalisations (sic) and admissions by principals that they have forgotten the primary purpose for which school exists, namely, to enhance pupil learning (p. 1).

Components of a Precision Teaching Model for Supervision of Instruction

Precision Teaching offers a set of procedures that can serve as components for a model of instructional supervision of teachers by principals, thus fulfilling the principal's role as an instructional leader. In developing Precision Teaching as a

model of instructional supervision of students by teachers, the founder of Precision Teaching, Dr. Ogden R. Lindsley, based the system on the work of Skinner's (e.g., Skinner, 1953) analysis of behavior. The five principles include (a) the student (or teacher) tells you how well they are learning (or learning to teach) through his or her responses, (b) the emphasis is on directly observable behavior, (c) frequency of response is a universal measure, (d) a standard chart to display celeration of learning, and (e) determining the relationship between environmental events and behavior (White, 1986).

The first principle (the learner knows best) is the foundation for evaluating any instructional model and leads to the first component of a Precision Teaching instructional supervision model. Student learning is the focal point by which all aspects of the instructional program are evaluated and decisions are made as other data are related to that of the student learning. If student learning does not occur, some aspects of the program need to be changed--a curricular decision needs to be made. The fault could be with the teacher's lack of following through on improving curricular decisions and changes (also counted and charted) or a principal who is not implementing the model correctly. This component of the Precision Teaching model is powerful in its assumption that (a) student learning is measured and (b) teacher behavior is measured and related to student learning.

Ann Duncan ("Precision teaching in," 1972) asked Dr. Lindsley a number of questions whose answers touch on the components of Precision Teaching as a model of instructional supervision. Initially Precision Teachers recorded students' performances. This proved too time consuming for most teachers, so, whenever possible, students were taught to chart their own behavior (Bower, 1985; Starlin, 1971). The same applies to the charting of teacher behavior. As pointed out in a number of articles, principals must respond to a large number of contacts, initiated by others, that result in a wide variety of activities of short duration that change rapidly throughout the day (Wolcott, 1973).

Another component of the Precision Teaching model is the focus on curriculum. To quote Lindsley, ". . . in precision teaching we try to get the child doing more successful classroom work by making curricular changes that involve him in the learning process, rather than trying to jack-up a dull curriculum with rewards for doing boring tasks" ("Precision teaching in," 1972, p. 115). The same applies to instructional supervision of teachers by principals. Substituting teacher for child in the above quotation shows the principal-teacher relationship is very much like that of the teacher-student relationship.

The use of frequency as a standard measure of behavior and use of a standard chart are additional components and hallmarks of Precision Teaching. Standard Celeration Charts

provide graphic representation of behaviors that occur once a day to as often as 1,000 times a minute (Eaton & Vox, 1983; Haughton, Maloney, & Desjardins, 1980; McGreevey, 1984; Pennypacker, Koenig & Lindsley, 1972). Virtually every aspect of the instructional behavior of a teacher falls within this range and can increase, decrease, or stay the same over time, i.e., celeration. Since the behavior of the teacher, in an effective model of instructional supervision, needs to be correlated with student behavior, a standard measure of behavior, coupled with a standard representation of change in behavior, improves communication and thus facilitates instructional supervision.

Summaries of student learning enhance the principal-teacher relationship in respect to decision making. Daily charts of student learning are summarized by the teacher every two weeks. This information is reported to the principal, who, in turn, summarizes the data from all teachers in the building. The principal keeps charts of the building-wide learning, as well as student learning, from individual teachers (Lindsley, 1979). This promotes the parallel drawn between the teacher-student and principal-teacher relationship in an effective model of instructional supervision.

Another component of the Precision Teaching model of supervision of instruction is making decisions on the basis of data. The use of learning pictures (All, 1977; Miller & Calkins, 1980; Wood & Fisher, 1980) in analyzing student learning has proven

quite useful in making appropriate decisions on student learning. This method, when applied to teacher behavior, has the capacity to yield similar effects as appropriate decisions are made on teacher learning.

The procedure for conducting an analysis of the relationship between environmental events and behavior is another important component (Calkin, 1986; Haughton, 1971; Lindsley, 1972; White, 1986). As applied to a model of instructional supervision of a teacher by a principal, the following must be answered: "What events arranged by the principal will increase the frequency of effective teaching behaviors by a teacher?" Lindsley (1964) developed a system for analyzing the relationship between environmental events and behavior that he termed the IS-Does Plan. The IS portion describes a relation to be analyzed, and the Does portion describes a relationship between environmental events and behavior that has been demonstrated to be functional, i.e., the events actually have an effect on behavior. For example, a principal might demonstrate that positive feedback to teachers on the number of pinpoints that meet definitions of movement and repeatability increases the acceleration of the number of pinpoints conforming to definitions over time. One application of the IS-Does plan by a principal involves direct observation and measurement of teacher-student interactions to identify functional relationships between certain teacher behaviors and student learning (Calkin, personal communication, May 1986).

Not all aspects of the Precision Teaching model are likely to be used to full advantage in current educational practice. The model has the capacity to provide daily monitoring of the learning demonstrated by each student as the student progresses through an individualized curriculum. Custom tailored correction in curricular content or change in teacher behavior can be made on the basis of change or lack of change in student learning. Thus, the model has the capacity for assessment of the need for changes in instructional programs that exceed current practice by, and perhaps even the capacity of, principals in most of the nation's schools (cf Fallon, 1979).

Of course, appropriate use of the components of the model does not mean that all the power has to be immediately put to use. Principals, when properly instructed in applications of the model, can add components and over time increase precision in instructional supervision.

Nonprecision Teaching Models of Instruction

Pohland (1976) provided a comparison of seven models of instructional supervision. The models were labeled administrative, clinical, counseling, curriculum, motivation, human relations, and microteaching. Each was analyzed according to 11 variables. The first eight variables were directly or indirectly related to the model. These variables were (a) conception of teaching, (b) basic assumptions, (c) focus of

supervision, supervisory role and function, (d) structure of model, (e) conceptual base, (f) specialized supervisor training, (g) intended outcomes. The last three variables, specifying organizational factors, were (a) organizational position of superior, (b) power base of superior, and (c) supervisor-teacher relationship. The analysis of the variables related to the model revealed high variability on many of the variables (e.g., scope of supervisory functions) and substantial overlap on others (e.g., position and authority of supervisor). Of importance to this study is that none of the seven models focus specifically on student learning as a basis for assessing the conceptual and operational adequacy of the model. The author points out that the pervasive purpose of all the models of instructional supervision is improvement of instruction, which is most often operationalized as "improvement of teaching" (p. 1). However, the concept of "improvement" has remained largely "nonoperationalized" due to measurement difficulties (p. 3). Most attempts at measurement have focused on the teacher. Rippey (1983) points out that the best measure of good teaching is not what the teacher does--it's what the student does.

Significant advancement in any field is dependent on the collection of research by scholars and practitioners. According to Pohland (1976), "supervision fares badly in this respect.

Even the 'clinicians' are reluctantly compelled to rest their case on personal conviction and experience" (p. 9).

Sullivan (1980) supports the position taken by Pohland. In an exhaustive search of the literature on the history, design, and research of clinical supervision, she reviewed research that purports to validate the model, shows teacher growth in self-confidence and self-direction, and demonstrates that the nature of the supervisor-teacher relationship affects the teacher-student relationship. The research does not address the relationship between clinical supervision and student performance. Likewise, Acheson and Gall (1980) reported that they were unable to locate any research relating student achievement to clinical supervision. They could find only indirect evidence suggesting that clinical supervision resulted in improved student performance.

Recent information (Pavan, 1985), suggests that a small body of knowledge is building in the area of clinical supervision research. A review of 29 studies yielded research results that were grouped into four major areas: (a) attitudes toward supervisor; (b) effects of training; (c) characteristics of school personnel, and (d) student achievement. Only the studies on the Hunter Model (1985), a version of clinical supervision, examined the relationship between clinical supervision and student achievement. Pavan (1985) reviewed studies conducted by Congdon, 1982; Mayfield, 1983; and Spaulding, 1984.

She concluded on the basis of these studies that it has "not been determined if there is a relationship between clinical supervision and student achievement" (p. 28).

In summary, while there are several models of instructional supervision, very few have had any empirical studies of their effectiveness. Those that have been conducted have primarily studied the clinical supervision model and focused on teacher-centered process variables rather than student-centered outcome variables. In those instances where student achievement was examined, no relationship between the clinical supervision model and the level of achievement could be demonstrated.

Overall, the review has established that the literature strongly supports instructional leadership/supervision as a highly important and valued role for principals. Second, the literature on Precision Teaching as applied to the teacher-student relationship strongly supports the expansion of the relationship and application of Precision Teaching to the principal-teacher-student relationship as a model of instructional supervision. Third, the literature leads to the conclusion that none of the models of instructional supervision reviewed sufficiently focus on achievement, performance, or student learning as the ultimate criterion of effectiveness. Extending the principles of Precision Teaching by adding the

principal to the teacher-student relationship creates the potential for a model of instructional supervision more effective than any in current use.

CHAPTER III

METHODS

Selection of Subjects

This study surveyed the use of Precision Teaching, reactions to Precision Teaching, and estimates of the study's results by three groups of educators: Precision Principals, Traditional Principals, and Precision Trainers. A Precision Principal is a principal who has been formally trained in Precision Teaching. A Traditional Principal is a principal who has not been formally trained in Precision Teaching. Both Precision and Traditional Principals may or may not supervise teachers who use Precision Teaching in their classrooms. A Precision Trainer is a person whose primary responsibility is to train others how to use Precision Teaching and who is not and usually has never been a school principal.

Precision Principals

The subjects of this group are practicing principals of public and private schools who represented elementary, secondary, and K-12 buildings and have been trained in Precision Teaching. Fifteen subjects employed as principals during the 1985-86 school year were included in the study.

A list of principals trained in Precision Teaching was generated by this researcher and the founder of Precision Teaching. The original list contained the names of eight principals. An initial contact was made to determine willingness to participate in the survey and to schedule a date and a time for the interview. A further purpose of the initial contact was to locate additional principals trained in Precision Teaching. One principal on the original list could not be located. This networking procedure, patterned after the Council for Exceptional Children Invisible College (Jordan & Robbins, 1972), identified principals who were trained in Precision Teaching. Fifteen subjects were selected and agreed to participate in the study.

The additional principals were selected primarily on their willingness to participate. However, selection also was dependent, at times, on geographic location. Precision training programs are located throughout the United States, and care was taken not to introduce bias through inclusion of an unequal number of principals trained in a particular setting. For example, if a principal, on an initial contact, named three principals trained in Precision Teaching who all supervised buildings in the same district, only the principal originally contacted was selected. The final sample included principals from throughout the United States and one principal from Canada.

Traditional Principals

A referral network of principals in northeast Kansas was used in selecting the Traditional Principals. Participation in the study required the principal's availability and willingness to provide the data. Fifteen principals were included in this group. The major criteria in selection were that the principal had not been trained in Precision Teaching, represented an elementary, secondary, or K-12 public or private school, and was employed as a principal during the 1985-86 school year.

Precision Trainers

These five subjects are members of a small, select group. Selection for the study was dependent on willingness to participate and the following criteria:

1. represent at least ten years in a Precision Teaching training situation
2. represent a different state and, if possible, a different geographic section of the country
3. represent one of three training models: college course, workshop, on-the-job training.

Data Collection and Instrumentation

The primary source of data was a survey questionnaire administered through a telephone interview with Precision and Traditional Principals and Precision Teaching Trainers

(see Appendix A). The survey instrument for the Precision Principals and Trainers was administered by a person trained in Precision Teaching to ensure consistency in any interpretation or clarification of questions. This researcher administered the survey for the Traditional Principals to insure that a currently active principal could interpret and clarify their questions. Both interviewers followed the list of specific tasks for an interviewer as outlined by Frey (1983, pp. 154-155). These tasks were:

1. Be familiar with the questionnaire.
2. Follow question wording and question order exactly; ask all of the questions.
3. Record responses exactly.
4. Be casual, conversational, and friendly.
5. Record first answer; it is usually closer to the truth.
6. Double-check your instructions before you begin.
7. Repeat answers for respondent if there is any doubt.
8. Double-check questionnaire to be sure that all items have been answered, answers recorded correctly, and status information (phone number, location) completed.

Telephone interviews were selected over mailed questionnaires because of the nature of the information required. Major advantages of the interview include flexibility; more accurate and honest responses are given as the interviewer can explain and clarify the questions for the individual; and probing can be used to follow up on incomplete answers (Gay, 1976).

A total of thirty-five people were interviewed: fifteen Precision Principals, fifteen Traditional Principals, and five Precision Trainers. Interviews for the trainers ranged from 15 to 30 minutes in length with a median of 20 minutes. One trainer completed the interview by writing the answers to the questionnaire. Interviews for the Precision Principals had a median length of 40 minutes and ranged from 21 to 83 minutes long. Several of these interviews were held during two sessions. Interviews for the Traditional Principals ranged from five to twenty minutes with a median of 15 minutes in length. A total of 879 minutes was spent interviewing the three groups of subjects for this study.

Interviews were recorded for later use in determining reliability. A recording device was attached to the receiver of the telephone and, with the permission of the interviewee, the telephone calls were recorded on a cassette tape recorder.

The procedures for collecting data from the Precision Principals included:

1. An initial contact to set a date and time for the interview and obtain names of other principals trained in Precision Teaching.
2. The recorded telephone interview was held and a second date and time established if the interview required more time than the interviewee had available then.

Procedures for the Precision Trainers and Traditional Principals consisted of making an initial telephone call and either conducting the survey at that time or setting an appointment for a later date and time.

Questionnaires

Three questionnaires were designed, one for interviewing each group of educators included in this study. Several questions were common to all three groups.

Precision Principal Questionnaires

Two questionnaires (see Appendix A) were designed for interviews with the Precision Principals. The initial interview questionnaire had three purposes. These were: establish a date and time for the final interview, obtain names of additional Precision Principals and solicit suggestions from the principals for items to include in the content of this study. Suggestions pertinent to the study were considered and included in the final interview questionnaire.

The final interview questionnaire was designed to include variables that might be related to successful use or discontinued use of Precision Teaching by principals trained in Precision Teaching. The questions were grouped according to topics (Frey, 1983) and a branching procedure allowed the interviewer to move to a different set of questions when the interviewee answered a question in a way that terminated that topic.

After the first two interviews, the interviewer, trained in Precision Teaching, was able to adjust the wording of those questions that posed difficulties in understanding to a more common language framework. Programs in Precision Teaching use slightly different descriptors, thus the need to adapt at times.

The questionnaire was designed to obtain answers to both specific quantitative questions and open-ended questions. Answers to the open-ended questions were later grouped and categorized.

The questionnaire has three major parts. Part one contains background information such as type of current position, years in position, years in Precision Teaching, and type of training. The second part contains questions specific to the extent of Precision Teaching use. Part three contains questions using a thirteen-point rating scale based on factors

(Lindsley, personal communication, February, 1986). Precision Principals responded to these questions by selecting the factor that most closely approximated their feelings, perceptions, or estimates.

Traditional Principal Questionnaire

The questionnaire (see Appendix A) was designed to elicit responses by the Traditional Principals regarding their feelings on current measurement practices and their reactions to Precision Teaching.

There are three parts to the instrument. Part one contains background questions. Part two provides questions that are more open-ended and require the Traditional Principal to respond with their opinions and ideas on measurement procedures used in the classrooms of their buildings. Part three contains questions that are answered on a thirteen-point scale by comparison factors. The Traditional Principal selected the factor that most closely approximated feelings, perceptions, or estimates on Precision Teaching. For those Traditional Principals who supervise Precision Teachers, a branch was provided, and the interviewer moved to a specific set of precision questions.

Prior to asking the set of questions on Precision Teaching, the interviewer provided the Traditional Principal with information on Precision Teaching. The following two paragraphs were read:

Precision Teaching is a systematic method of monitoring student performance and measuring student learning. This approach allows for whatever instructional tactics and curricula a teacher might employ. The tools of Precision Teaching consist of:

direct observation of behavior

use of frequency as the universal measure

charting these frequencies on a standard chart

evaluating the learning patterns these frequencies make on the chart

describing and analyzing environmental conditions that appear to influence behavior

The fundamental guiding principle is that the learner knows best. By looking objectively at the learning patterns of the learner, we can let the student tell us, through data, what to adapt to meet his or her individual needs.

Precision Trainer Questionnaire

The questionnaire (see Appendix A), designed for interviewing Precision Trainers, contained questions that required

they estimate numerical responses or celeration values to represent their predictions on the outcomes of this study. One question required the Precision Trainers to respond with a personal feeling.

Data Analysis and Interpretation

The study is quantitative. The results from the questionnaire were charted on the Standard Celeration Chart either as frequencies, frequency distributions, or celeration distributions. Dates were converted to years before they were charted. Results that are charted as celeration lines involve data from the initial date of implementation and data at the present time. Other data are listed in summary tables.

When comparisons within a group or between groups were made, e.g., comparison of variables that might affect the continuance or discontinuance of Precision Teaching by principals trained in Precision Teaching, a Fisher's Exact Probability was computed.

Responses to open-ended questions that were not grouped or categorized with quantitative results are presented in narrative form or lists.

Standard Celeration Chart

The Standard Celeration Chart (SCC) was chosen to summarize and present the data collected in the study. There

are four versions of the SCC: daily, weekly, monthly, and yearly. Yearly and monthly charts were appropriate for this study.

The SCC has an equal ratio logarithmic scale which allows equal ratios to be represented by equal distances anywhere on the chart. It is easy to compare proportional relationships independent of frequencies. For example, the proportional difference between 50 and 200 is X4. Likewise the proportional distance between 1 and 4 is X4.

A dimension that Lindsley added to the SCC that makes it unique from other semi-logarithmic charts was standardizing the slopes. A constant amount of growth is represented by the same angle at any place on the chart, i.e., the value of the growth is independent of the frequency. A diagonal line drawn from the bottom left corner to the top right corner on any version of the chart represents a X2 or doubling. This line has an angle of 33 degrees on all standard celeration charts.

Reliability

Inter-rater Reliability

Reliability of the data presented was assessed by determining the extent to which a second listener agreed with the record a first listener made while conducting a telephone

interview. The second listener responded to an audiotape of the interview and completed a comparison record. The two records were compared item by item. Any item that was missing from the audiotape or was inaudible was coded as NR (No Record) by the second listener and was eliminated from the comparison. Any item the first listener skipped because the answer to a previous question rendered one or more subsequent questions nonapplicable was coded NA (Not Applicable) by the second listener and eliminated from the comparison. This resulted in a comparison of only those interview questions that the interviewee actually answered. The answers were coded. A comparison of the two records resulted in a count of those answers to questions where the codes recorded by the first and second listeners were in agreement and a count of those where the codes recorded by the two listeners were in disagreement. The number of agreements was divided by the number of disagreements plus agreements and multiplied by 100 to obtain the percent the two listeners agreed on the answers to interview questions.

A number of rules for coding, as listed below, were developed and applied to the answers given by the interviewee.

1. If a range is given, the mean of the range in the answer is coded, e.g., an answer of "somewhere between two and three hundred charts" would be coded as 250.

2. If several years are given as an approximate date when something initially occurred, the first year in the answer is coded, e.g., an answer of "sometime around '75 or '76," would be coded as '75.

3. If several years are given as an approximate date when something last occurred, the last year in the answer is coded, e.g., an answer of "I attended the conferences on Precision Teaching in 75, 76, and 77," would be coded as 77.

4. If a question requires a code for each of several components but no answer is given for one or more of the components, a zero is coded, e.g., an answer of "I believe insufficient time is the reason I quit charting" results in a zero coded after lack of funds, no interest, and the other components.

The presence of a permanent audiotape of the actual interview that could be replayed as necessary resulted in an accurate coding of answers and a high percentage of agreement. In some cases, what initially appeared to be a disagreement was later identified as a recording error on the part of one of the two listeners. For example, one record may have had an answer coded as X2 and the other as /2. A replay of the tape would determine which answer was the one given by the interviewee; and, if the listener agreed the answer had originally been coded incorrectly, the incorrect record could be corrected.

Where disagreements occurred, it most often was on those answers that required interpretation. For example, one interviewee gave the answer that teachers were often "overwhelmed" when first learning about Precision Teaching. One listener coded this as a negative answer, and the other listener coded it as a neutral answer. In this case, the disagreement could be resolved only by a retrospective clarification of what specifically would constitute a positive, neutral, or negative answer. While this may have been possible, it was believed that the positive, neutral, or negative intent of certain answers could be known only by the person being interviewed, e.g., did the interviewee believe teachers are overwhelmed by the power of Precision Teaching or by perceived difficulties in implementation? Thus, the disagreement is a limitation inherent in the design of the questionnaire, and the original code assigned by each listener should stand and remain a disagreement. Fortunately, the number of disagreements was very low, and the reader can assume with a high degree of reliability that the data used in the analysis are extremely close to what was actually said.

The reliability data are reported in the results section.

Interview-Reinterview Reliability

Approximately six weeks following the first interview, a second telephone interview with three subjects was conducted.

The questionnaire from the first interview was used. Reliability of the interview-reinterview was assessed by determining the extent the verbal behavior of the principal on one occasion was consistent with verbal behavior on a second occasion.

Both exact and essential reliability were determined. Exact reliability was determined by counting the number of times an answer given to a question in the first interview was identical to the answer given to the same question in the second interview. Identical answers were scored as agreements. Essential reliability was determined by counting the number of times an answer given to a question in the first interview was within a previously determined narrow range of the answer to the same question in the second interview. When the second answer was within the acceptable range, an agreement was scored.

With some questions (e.g., what do you estimate is your average building-wide celeration?) the answer could vary slightly either due to change during the six-week interval or failure to recall the exact value of the estimate originally given. For these reasons, exact reliability was judged to be too harsh a test, and a range of values constituting essential reliability was defined.

Four coding rules were developed and applied to the answers given during the second interview as they were compared with the answers given in the first interview:

1. An agreement is coded if the answer given in the second interview for number of charts, students, discoveries and decisions is + or - 10 of the number given in the first interview.

2. An agreement is coded if the number given in the second interview for teachers is + or - two of the number given in the first interview.

3. An agreement is coded if a celeration answer in the second interview is .1 above or below the celeration answer given in the first interview.

4. An agreement is coded if a factor, e.g., X10, given to a rating question in the second interview, is one factor above or below the factor given in the first interview.

In computing both exact and essential reliability of the principal's interview-reinterview, the number of agreements was divided by the total number of agreements plus disagreements and the quotient multiplied by 100.

The exact and essential reliability data are reported in the results section.

Limitations of the Study

The study did not sample all principals who have been trained in Precision Teaching. This researcher estimates that approximately 250 principals have received training in Precision Teaching. This study sampled 6% of the group of principals who have been estimated to be trained in Precision Teaching.

This is the first study to explore the implementation of Precision Teaching by principals. This is a pilot study intended to focus on identifying variables that may relate to the continuation or discontinuance of Precision Teaching by principals.

CHAPTER IV

RESULTS AND DISCUSSION

The nine research questions, presented in Chapter I, provide the framework for reporting the findings of this study. Research question nine asks how reports from the survey compare with estimates made by Precision Trainers. These estimates are noted and, when relevant, are compared to findings pertaining to the other eight questions. Results of interrater and interview-reinterview reliability are presented as a separate section at the end of this chapter.

Throughout this chapter the following conventions are used. Precision Principals, i.e., those trained in Precision Teaching, may be referred to as PP. Precision Principals who have continued to use Precision Teaching and the Standard Celeration Chart may be referred to as PPc. Those who have not or do not at this time use Precision Teaching and/or the chart may be referred to as PPn. The Standard Celeration Chart may be referred to as SCC. The sample of Traditional Principals may be referred to as TP and the sample of Precision Trainers as PT. Finally, the terms Precision Teacher and Traditional Teacher may be referred to as Pt and Tt, respectively.

Research Questions

Question 1

How durable is the use of Precision Teaching in their principalship as reported by selected principals across the United States and one province in Canada who were trained in Precision Teaching?

Fifteen principals trained in Precision Teaching were asked through a telephone interview about their use of Precision Teaching in their present principalship. Eight of the 15 Precision Principals reported that they currently use Precision Teaching in their principalship. Seven of the 15 Precision Principals reported that they either no longer apply or have not applied the principles of Precision Teaching to their principalship and do not chart.

This finding is consistent with the outcome of a study of ten Precision Teaching school programs (Albrecht, 1984). Six of the ten Precision Teaching programs are active; four are inactive. The study of programs found 60 percent have continued their use of Precision Teaching. In this study of principals, 53 percent who had been trained in Precision Teaching reported that they continued to chart or supervise charting in their principalship. The percentage of active Precision Teaching programs and principals who continue to use Precision Teaching are similar.

Albrecht (1984) also reported that the Great Falls Precision Teaching program expanded to include training of regular education teachers. Of the regular education teachers who were trained, 50 percent used the Precision Teaching procedures in their classrooms, and 50 percent did not use the procedures. An assumption that could be formed from these studies is: After a group of people are trained in specific procedures, approximately 50 percent will implement the procedures, and approximately 50 percent will abandon the procedures or not implement them.

The Precision Trainers estimated a median of 4 of the 15 Precision Principals would report that they have continued to chart while 11 of the 15 would report that they had stopped charting. (See Table 1.) As mentioned above, the survey found eight principals continuing to chart and seven principals who were not charting. The actual number of principals surveyed in this study who have continued to chart surpassed the estimates by the Precision Trainers. The difference between the estimates and the actual number of Precision Principals who chart (referred to as PPc) by the Precision Trainers (referred to as PT) is a X2 difference, i.e., the PT estimated only half as many principals surveyed would continue to chart than actually did continue. While Precision Trainers in the field appear to be less optimistic about the number of principals

who will continue to chart than the number found to actually continue, this difference is not statistically significant ($p = .10$).

TABLE 1

ESTIMATES BY PRECISION TRAINERS ON THE CONTINUED USE OF PRECISION TEACHING BY PRECISION PRINCIPALS

	PT Estimates	Actual
PPc	4	6
PPn	11	7

$p = .10$

Question 2

What are the characteristics of the principals surveyed in this study?

Figure 1 shows the distribution across the United States and one province in Canada of Precision Principals (PP). Principals from nine states and one province comprised the group of PP. The Traditional Principals (TP) reported from five states and one Canadian province (see Figure 2) while the Precision Trainers who were contacted reported from five states (see Figure 3).

Members of both the PP and the TP samples supervise buildings of similar size, as shown in Figure 4. The number

FIGURE 1. SITES OF SURVEYED PRECISION PRINCIPALS

FIGURE 2. SITES OF SURVEYED TRADITIONAL PRINCIPALS

FIGURE 3. SITES OF SURVEYED PRECISION TRAINERS

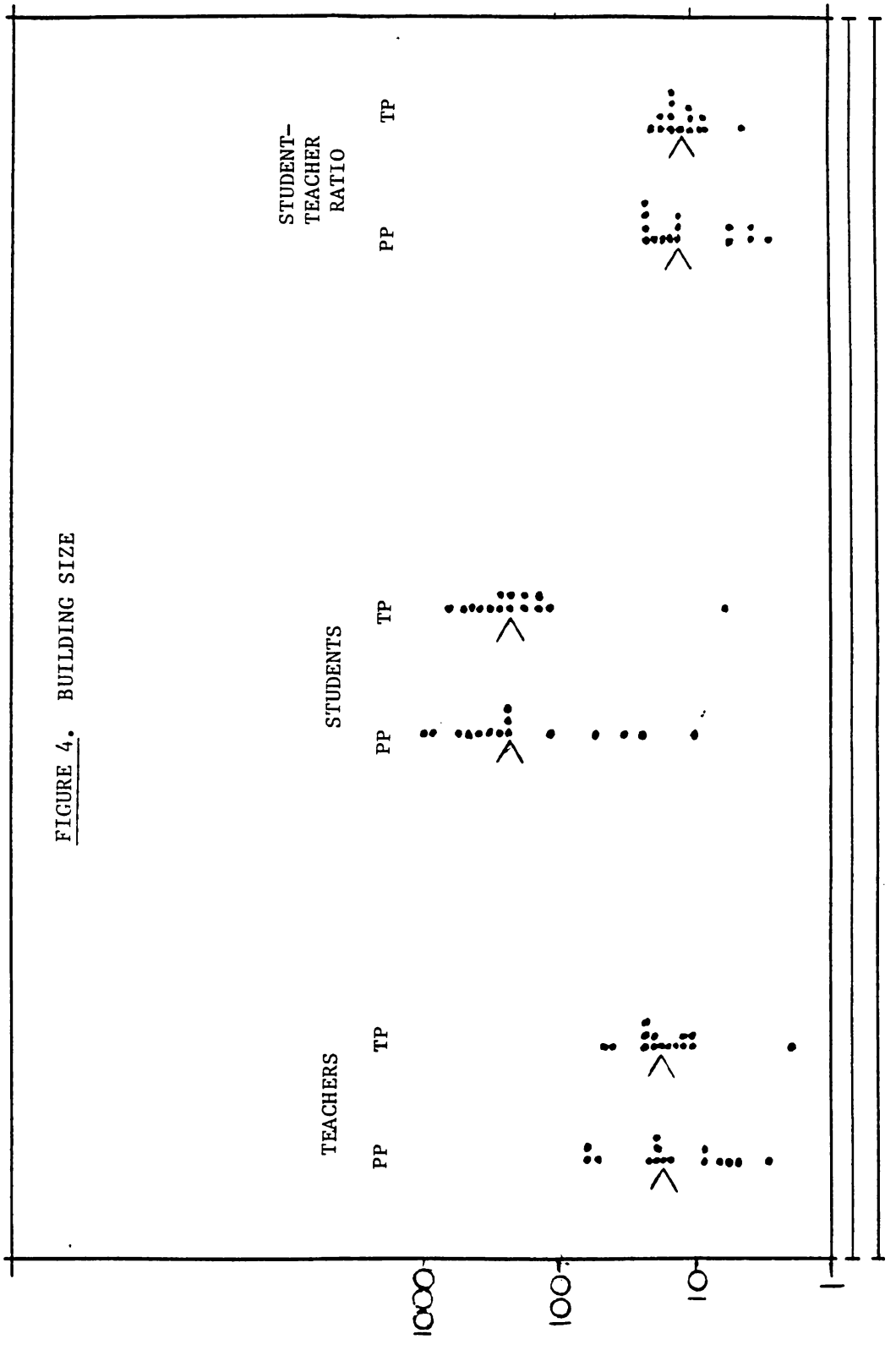


FIGURE 4. BUILDING SIZE

of teachers in PP buildings ranged from 3 to 64 while the number of teachers in TP buildings ranged from 2 to 49. The median number of teachers was 19 per building for both PP and TP.

The number of students in a PP building ranged from 10 to 980 with a median of 240 students. In TP buildings the number of students ranged from 6 to 657 with a median of 243.

A student-teacher ratio was computed for each group. The range in PP buildings was from 3:1 to 24:1. The student-teacher ratio in TP buildings ranged from 3:1 to 21:1. The median student-teacher ratio for both groups was 13:1.

The age of PP ranged from 35 to 64 years with a median age of 43. The TP ranged in age from 34 to 61 with a median age of 44 years.

The PP sample included six females and nine males. The sample of TP had 2 females and 13 males.

Three levels of building organization are represented across PP and TP: elementary, secondary, and K-12. As shown in Table 2, PP had 53.3 percent representation by elementary schools, 13.3 percent by secondary schools, and 33.3 percent by K-12 schools. All elementary and secondary schools were regular and public. Five K-12 schools were special purpose with four of them private and one public.

Forty-seven percent of the TP sample were principals of elementary schools, and 47 percent were principals of secondary

schools. One TP (6%) was principal of a K-12 school. All seven elementary schools were public schools. One secondary school was private, and six were public. The K-12 school was in the private sector.

TABLE 2

DISTRIBUTION OF PP AND TP BY TYPE OF SCHOOL

	Precision Principals			Traditional Principals		
	El	Sec	K-12	El	Sec	K-12
Regular	8 (53%)	2 (13%)	0 (0%)	7 (47%)	7 (47%)*	0 (0%)
Special Purpose	0 (0%)	0 (0%)	5 (33%)**	0 (0%)	0 (0%)	1 (6%)*

*Includes one private school in each group
**Includes four private schools and one public school

Although Precision Principals and Traditional Principals differed in their representation at the elementary, secondary, and K-12 levels, they are similar when comparing those dimensions that reflect their supervisory responsibilities. Both groups reported similar or exact medians on number of students, teachers, and ratio of students to teachers. They also were similar in age with a median difference of one year. The two groups differed on the number of male and female representatives.

Precision Principals who chart (PPc) reported some interesting data on the characteristics of their instructional programs.

Figure 5 shows the reports concerning growth of students, teachers, and charts in the instructional programs currently supervised by PPc. The celerations for students ranged from /2.2 to X7 with median celerations at X2.6 and X3. The number of charts kept or supervised by PPc ranged from /2.3 to X7 with the two medians X2.8 and X5. The celeration of teachers ranged from /2.2 to X9 with the median at X2.2 and X3. Middle celerations across students, charts, and teachers, shown by heavier lines, are growing by doubling and tripling every five years.

No clear relationship exists between frequency and celeration. High and low initial frequencies were followed by either higher or lower ending frequencies across students, charts, and teachers resulting in both X and / celerations. In other words, both X and / celerations are scattered within the frequency distributions to represent the growth or decline in number of students, charts, and teachers. The data presented in Figure 5 demonstrate once again that frequency and celeration are independent (Lindsley, 1979).

Two instructional programs supervised by PPc are decreasing, as shown in Figure 6. One Precision Principal (PPc5) reported that this deceleration was planned, and a decrease in enrollment allowed more concentration in high technological areas. The reduction of students allowed a student-teacher

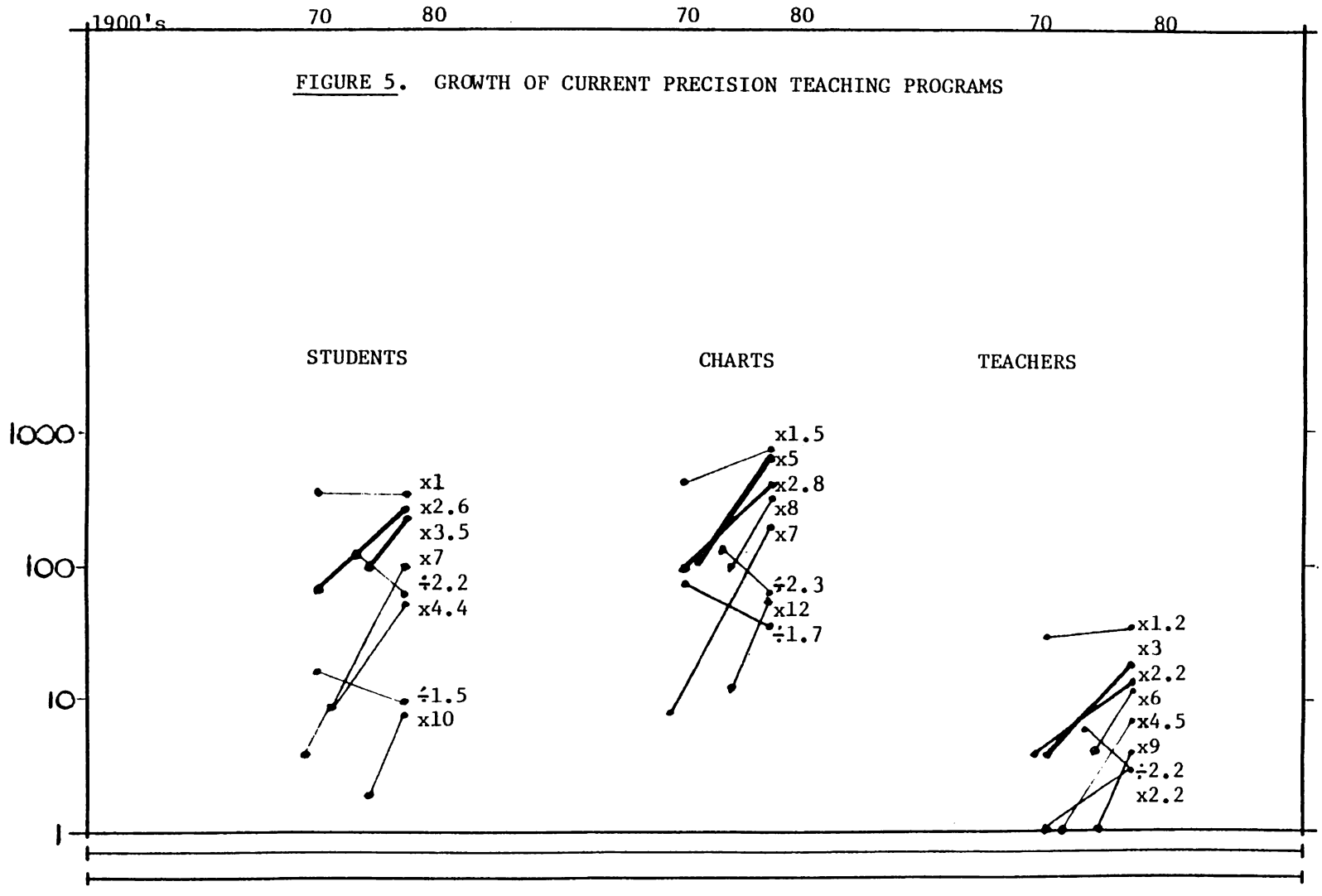


FIGURE 5. GROWTH OF CURRENT PRECISION TEACHING PROGRAMS

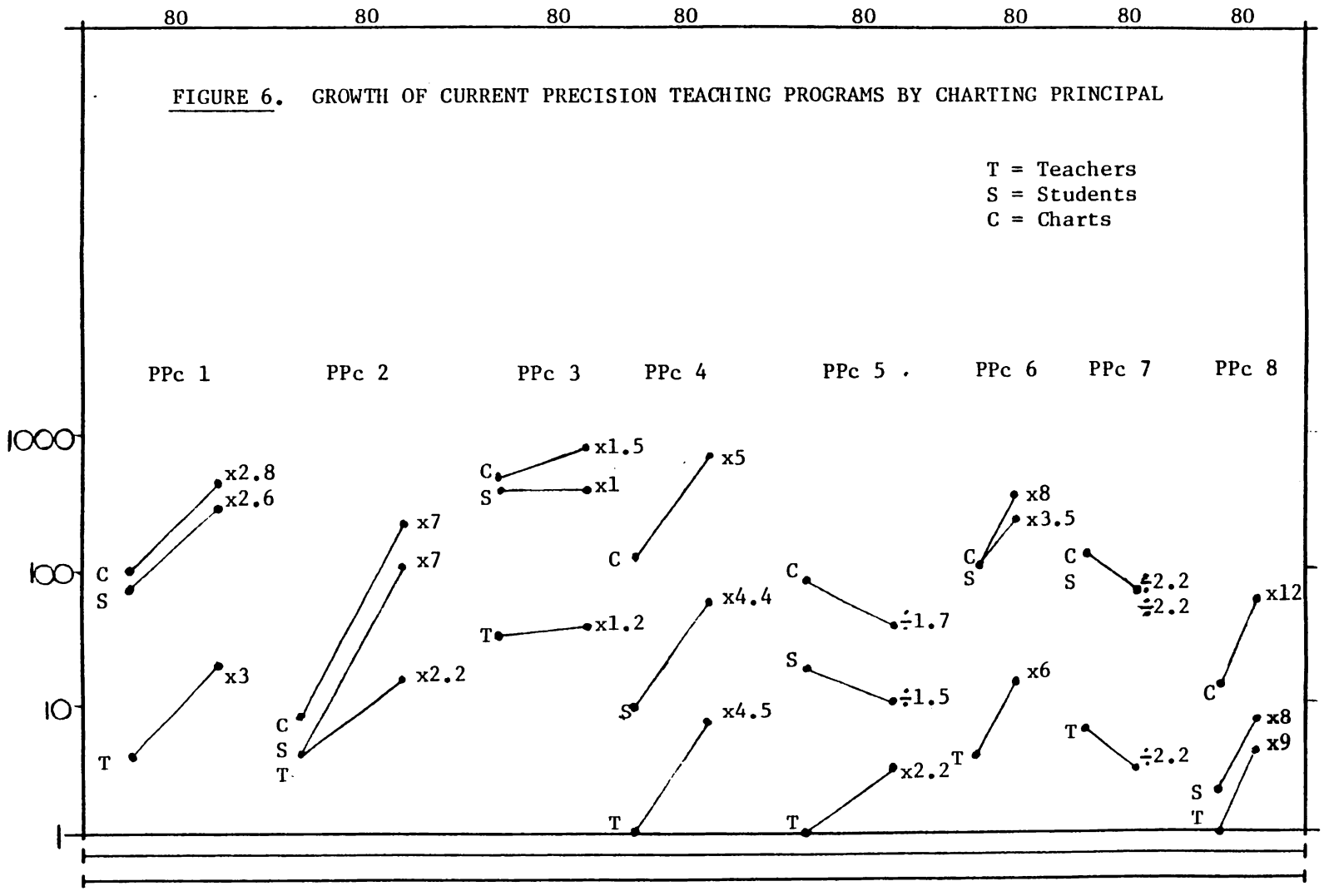


FIGURE 6. GROWTH OF CURRENT PRECISION TEACHING PROGRAMS BY CHARTING PRINCIPAL

ratio conducive to implementation of a concentrated program. The other Precision Principal (PPc7) explained the decrease as resulting from the replacement of Precision Teachers (Pt) by Traditional Teachers (Tt).

PPc4 supervises an instructional program that generates the most charts per student (13). Even though two teachers in the building do not chart, each student has an average of 13 charts of their learning.

Seven of the eight principals supervised programs where charted students had more than one chart. This ratio suggests that a variety of academic behaviors are charted and the use of Precision Teaching is not limited to one academic area.

PPc7 supervises a program that could end within the next few years. As previously mentioned, Precision Teachers are replaced by Traditional Teachers as turnover occurs within the building, thus indicating little commitment to maintenance of Precision Teaching. PPc5 also supervises a program where deceleration is occurring. That program will most likely continue even though its absolute size is decreasing. The data presented in Figure 6 show it is possible for schools to have celerations as high as X8 for growth of students, X9 for growth of teachers, and X12 for growth of charts every five years.

Schools that were K-12 and served special-purpose students (see Table 3) represented 50 percent of the PPc. Seventy-five percent of the special-purpose schools were private. Thirty-seven and a half percent of the principals who have continued to chart are principals of elementary buildings, and 12.5 percent are principals of secondary buildings. All elementary and secondary school principals are principals of public educational programs.

TABLE 3

DISTRIBUTION OF CHARTING PRINCIPALS BY TYPE OF BUILDING

	PPc		
	Elementary	Secondary	K-12
Regular	3 (38.5%)	1 (12.5%)	0 (0%)
Special Purpose	0 (0%)	0 (0%)	4 (50%)*

*3 out of 4 (75%) are private schools.

Principals who chart are supervisors at all levels: elementary, secondary, and K-12. When surveyed for this study, Precision Principals made comments indicating that, before Precision Teaching will be successful at the secondary level, more pinpoints for higher level thinking skills are necessary.

Question 3

What variables are related to continuing or discontinuing the use of Precision Teaching by selected Precision Principals?

The Precision Principals who chart (PPc) have used Precision Teaching from 4 to 19 years with the median being 10.5 years (see Figure 7). Five PPc acquired their current positions within the past seven years. Four of the five reported implementing Precision Teaching the first year of their new position. One principal began implementation during the second year of his new position.

Figure 7 shows the number of years the PPc have been charting and the number of years the PPn charted before discontinuing. The PPc group ranged from 4 years to 19 years with a median of 11 years. The PPn reported a range from 4 years to 11 years with a median of 8 years. The number of years charting principals charted is greater than the number of years noncharting principals charted. The PPc have charted 1.4 times longer than the PPn. However, the overall difference in the number of years of charting between principals who chart and those who no longer chart is not statistically significant ($p = .24$).

Figure 8 presents the number of charts the PPc keep and the number the PPn kept when they were charting. The PPc ranged from 36 to 750 a year with a median number of charts a

FIGURE 7. LONGEVITY--YEARS OF CHARTING

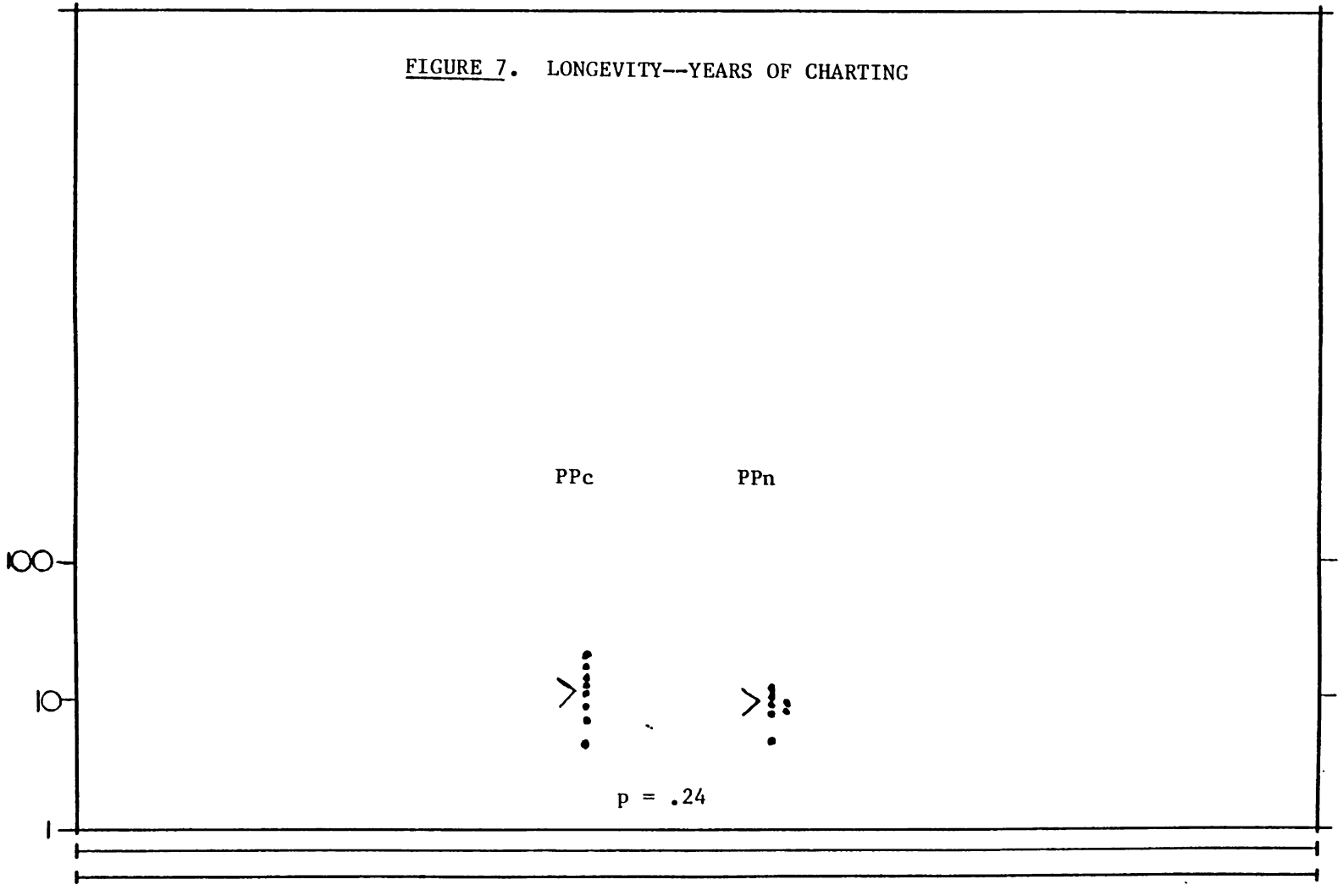
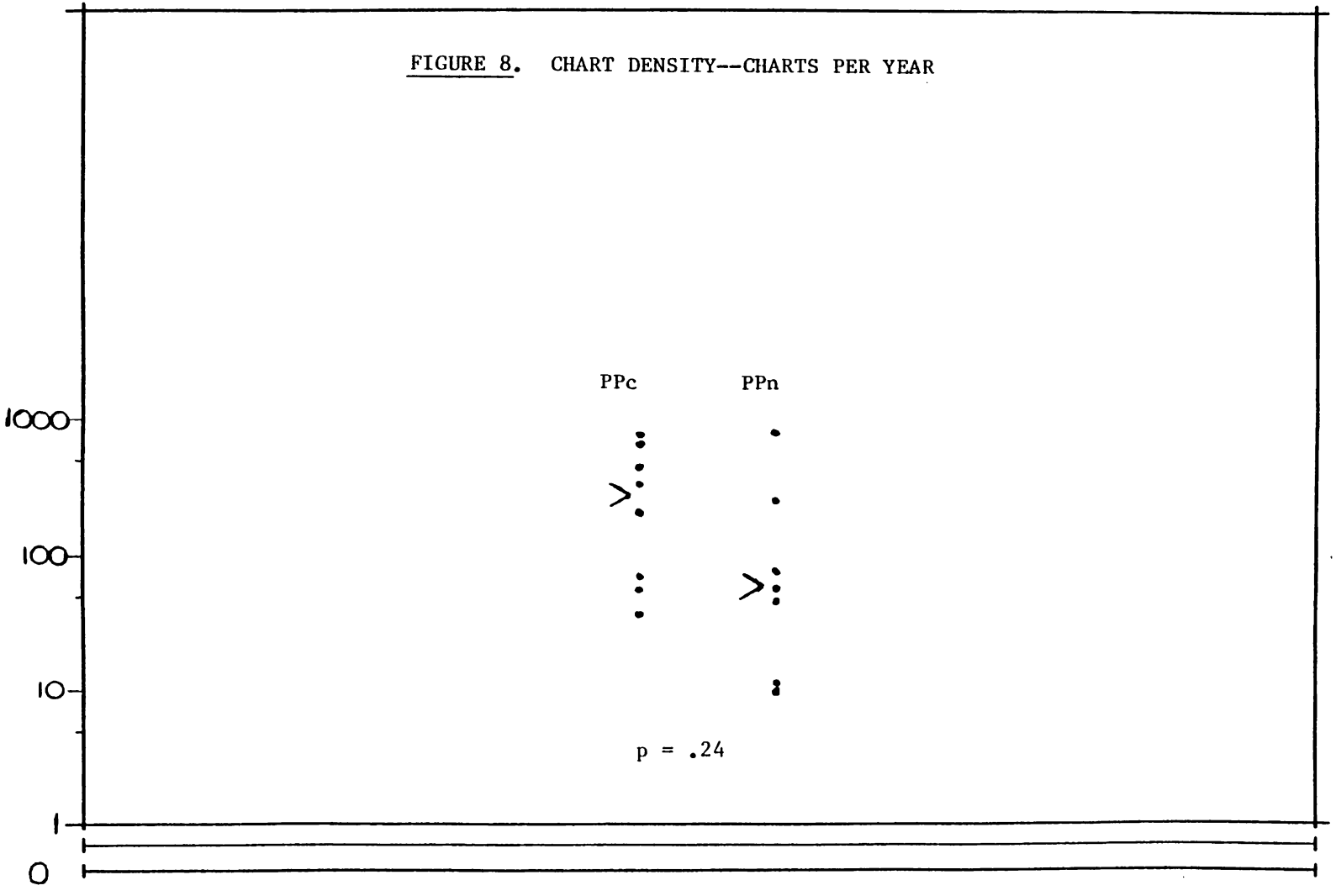


FIGURE 8. CHART DENSITY--CHARTS PER YEAR



year at 240. The PPn ranged from 10 to 750 charts a year with a median of 56 a year. Principals who have continued to chart keep 4.5 times more charts a year than principals who later stopped. However, the difference between principals who have continued to chart and those who stopped in relation to the number of charts kept a year is not statistically significant ($p = .24$).

Two of the noncharters had very low numbers of charts. These numbers are half a range away from the others of the PPn. When they are removed from the distribution, the difference between medians remains large, a X3.5 difference in medians; however, there is no statistically significant difference ($p = .38$).

The more charts a principal keeps could be considered an indication of the level of commitment to Precision Teaching.

All Precision Principals reported the mid-1970s as the median years they received their initial training in Precision Teaching. The PPc training ranged from the years 1967 to 1982, and the PPn training ranged from 1970 until 1978. A difference in the range of years each group was trained is noted. The Precision Principals who stopped charting spanned eight years in the 1970s when they received their initial training. The Precision Principals who chart reported their training occurred over a longer span of years from the 1960s to the early 1980s, with five receiving their training in the 1970s.

Initial training for Precision Principals was predominantly provided through enrollment in college courses or through job related training activities such as workshops or on-the-job consultation (see Table 4). Two of the eight PPc reported that college courses provided them with their initial training. The remaining six PPc received training through workshops or on-the-job consultation. Five of the PPn received training from college courses, and two attended workshops or received on-the-job consultation as their initial introduction to the use of Precision Teaching. More principals who were trained through workshops or on-the-job consultation have continued to chart than those who received training through college courses. This is not a statistically significant difference ($p = .09$).

TABLE 4

DISTRIBUTION OF PRINCIPALS BY TYPES OF TRAINING

Types of Training	PPc	PPn
College Course	2	5
Workshop/On-the-Job Consultation	6	2

($p = .09$)

The issue surrounding the college-course training versus workshop/on-the-job consultation could be related to what motivates people to enroll in college courses, register for workshops, or participate in on-the-job consultation. People seek out training for specific information or purposes when they attend workshops or receive on-the-job consultation. Information in college courses is often presented as a part of a prearranged curriculum. In addition, college courses are frequently taken to fulfill degree and/or certification requirements and often are not taken because of the specific content of the course.

Precision Principals were asked what they were doing professionally when they were initially trained (see Table 5). The PPc reported that four were principals during the time they received training, and zero were teachers. The PPn reported that three were teachers and two were principals when they received initial training. The difference between charting principals and noncharting principals when compared to whether they were a principal or a teacher during initial training is not statistically significant ($p = .12$).

Precision Principals who were trained in Precision Teaching as teachers stopped charting. One hundred percent of the principals who were trained as teachers stopped charting either when they became a principal or during their principalship.

Of the six Precision Principals who were trained while they were employed as principals, 33.3 percent stopped charting, and 66.6 percent continued to chart. When a Precision Principal received training during the principalship, questions from the principal's perspective were able to be addressed. The same occurs for those trained while teaching. Moving from the position of teacher to that of principal requires a greater degree of generalization of information than occurs when training for the principalship while practicing as a principal. Teachers trained in Precision Teaching who later become principals may need additional training to implement Precision Teaching during their principalship.

TABLE 5

DISTRIBUTION BY POSITION DURING INITIAL TRAINING IN PRECISION TEACHING

	PPc	PPn
Teacher	0	3
Principal	4	2

$p = .12$

Table 6 shows Precision Principals divided on whether or not they were employed or they were students during initial training. Eleven of the 15 Precision Principals were employed

during initial training. Six of the 11 were PPc, and 5 of the 11 were PPn. Four of the 15 were students during training. Two of these four were PPc, and two were PPn. The statistical difference between PPc and PPn and whether or not they were employed is not significant ($p = .43$). What a principal was doing professionally, principal or teacher, and whether they were employed or a student during initial training was found to be unrelated to whether or not they continued to chart.

TABLE 6

DISTRIBUTION OF PRINCIPALS BY WHETHER THEY WERE EMPLOYED OR STUDENTS DURING INITIAL TRAINING

	PPc	PPn
Employed	6	5
Student	2	2

$p = .43$

The three major types of charts kept by principals are: instructional, social management, and personal administrative. Table 7 shows the types of charts the principals use or used in their principalship. Since 15 of the 15 Precision Principals reported the use of instructional charts, there was no significant difference between charters and noncharters ($p = 1$).

TABLE 7

DISTRIBUTION OF PRINCIPALS BY TYPES OF CHARTS USED

Types of Charts	PPc	PPn
Instructional*		
Yes	8	7
No	0	0
Management**		
Yes	4	7
No	4	0
Personal/Administrative***		
Yes	5	5
No	3	2

*p = 1
**p = .05
***p = .39

Four of the eight PPc reported that they use management charts in their principalship, and four reported that they do not use them. Seven of the seven PPn reported that they previously kept or supervised the keeping of management charts. The difference between PPc and PPn in relation to keeping or not keeping management charts was statistically significant ($p = .05$).

Ten Precision Principals reported keeping personal/ administrative charts. Five of the ten were PPc and five

were PPn. Three of the PPc reported that they do not keep personal/administrative charts, and two PPn reported that, when charting, they did not keep personal/administrative charts. The difference between PPc and PPn in relation to whether or not they keep or kept personal/administrative charts is not statistically significant ($p = .39$).

The significance of the difference between the principals who chart and those who stopped charting in relation to the keeping of management charts is significant in the unexpected direction. Even though 100 percent of the Precision Principals who stopped Precision Teaching kept management charts, it did not influence them to continue to chart. What is unknown is whether or not charting management charts increases the possibility that a principal will drop charting. The data in Table 7 suggest that a relationship does not exist between the types of charts a principal keeps or supervises and whether or not charting is continued in the principalship.

Principals were asked whether their use of Precision Teaching was rewarded, ignored or punished by their superiors, family, and others. Table 8 shows the relationship between those principals who have continued to chart and those who stopped charting and whether they were rewarded or not for charting by superiors, family, and others. When asked about superiors, four PPc reported that they had been rewarded by

superiors, and four reported that they had not been rewarded. None of the PPn reported that they had been rewarded by superiors. The difference between principals who chart and those who later stopped in relation to whether or not they were rewarded by superiors for charting is statistically significant ($p = .05$).

TABLE 8

REPORTS OF REWARDS AT WORK AND HOME

	Ppc	PPn
Superiors*		
Rewarded	4	0
Not Rewarded	4	7
Family**		
Rewarded	6	3****
Not Rewarded	2	3
Others***		
Rewarded	3	1
Not Rewarded	5	6

*p = .05
**p = .28
***p = .29
****One PPn did not report on family, resulting in a sample size of six.

Six of the eight PPc reported being rewarded by their family, and two reported they were not rewarded by their family.

Three of the six PPn reported being rewarded by their family, and three reported not being rewarded. The difference between PPc and PPn in relation to whether or not they were rewarded by their family is not statistically significant ($p = .28$).

The principals also reported whether or not they were rewarded for charting by others. Three PPc and one PPn felt rewarded by others. Five PPc did not feel rewarded, and six PPn did not feel rewarded by others. The difference between the two groups is not statistically significant ($p = .29$).

Responses to the questions regarding principals being rewarded, ignored, or punished for charting by superiors, family, or others were grouped according to whether principals reported they were ignored or not ignored (see Table 9). Three of the eight PPc reported they were ignored by their superiors, and five reported they were not ignored. Four of the PPn reported being ignored by their superiors, and three reported not being ignored. The difference between the PPc and PPn on whether or not they were ignored by their superiors is not statistically significant ($p = .3$).

Two PPc reported that they were ignored by their families, and five reported they were not ignored. Three PPn reported being ignored by their families, and three were not ignored. The difference between those who were ignored and not ignored for charting and whether or not they continued to chart is not statistically significant ($p = .33$).

TABLE 9

DISTRIBUTION OF PRINCIPALS BY WHETHER THEY WERE IGNORED

	PPc	PPn
Superiors*		
Ignored	3	4
Not Ignored	5	3
Family**		
Ignored	2	3****
Not Ignored	5	3
Others***		
Ignored	1	5
Not Ignored	7	2

*p = .3
**p = .33
***p = .03
****One PPn did not report on family, resulting in a sample size of six.

One PPc reported being ignored by others. The other seven PPc were not ignored. Five PPn reported being ignored by others, and two were not ignored. The difference between the two groups, principals who chart and those who stopped, and whether or not they were ignored for charting is statistically significant ($p = .03$). Principals who reported being ignored by others stopped charting more often than principals who were not ignored by others.

There were two reports of punishment for charting. These reports were made by the PPc. One reported being punished by a superior, and one reported being punished by others.

The PPc reported that they were rewarded more often and by more groups of people than was reported by the PPn as presented in Table 10. Seventy-five percent of the PPc were rewarded by their families; 50 percent were rewarded by superiors; and 38 percent were rewarded by others. The PPn reported that 50 percent of the group were rewarded by family, 14 percent were rewarded by others, and no one reported being rewarded by superiors.

TABLE 10

DECREASING ORDER OF THOSE WHO REWARDED PRINCIPALS

Rewarded by	PPc	% of PPc	Rewarded by	PPn	% of PPn
Family	6	75%	Family	3	50%
Superiors	4	50	Others	1	14
Others	3	38	Superiors	0	0

The PPc had 24 opportunities to report that they were rewarded by superiors, family, and/or others. They responded to 13 of these opportunities (see Table 11). The PPn had 20 of the same opportunities, and they responded to four of them. The difference between charting principals and noncharting

principals in relation to their reports on rewards and the opportunities they missed to report rewards is statistically significant ($p = .02$).

TABLE 11

OPPORTUNITIES TO RESPOND ABOUT REWARDS AND THE ACTUAL REPORTS

	PPc	PPn
Reports of Rewards	13	4
Missed Opportunities	11	16
Total Opportunities	24	20

$p = .02$

There are three statistically significant differences between PPc and PPn regarding their reports on whether they were rewarded, ignored, or punished by superiors, family, and others. These differences are:

1. Principals who chart reported they were rewarded more by their superiors than was reported by principals who stopped charting ($p = .05$).
2. Principals who stopped charting reported they were ignored more by others than was reported by principals who chart ($p = .03$).

3. Principals who chart reported more rewards from the total opportunities to report being rewarded than the principals who discontinued charting ($p = .02$).

These differences support one of Skinner's (1953) major contributions to behavioral science. His contribution is: Behavior is a function of its consequences. Principals require support and rewards to continue the use of Precision Teaching in their educational setting. Acquiring the skills necessary to implement Precision Teaching is not sufficient. The use of these skills needs to be positively consequated in order to maximize the probability that principals will maintain Precision Teaching. Unfortunately, the natural consequences of charting student learning that increases greatly does not act as a reward for charting.

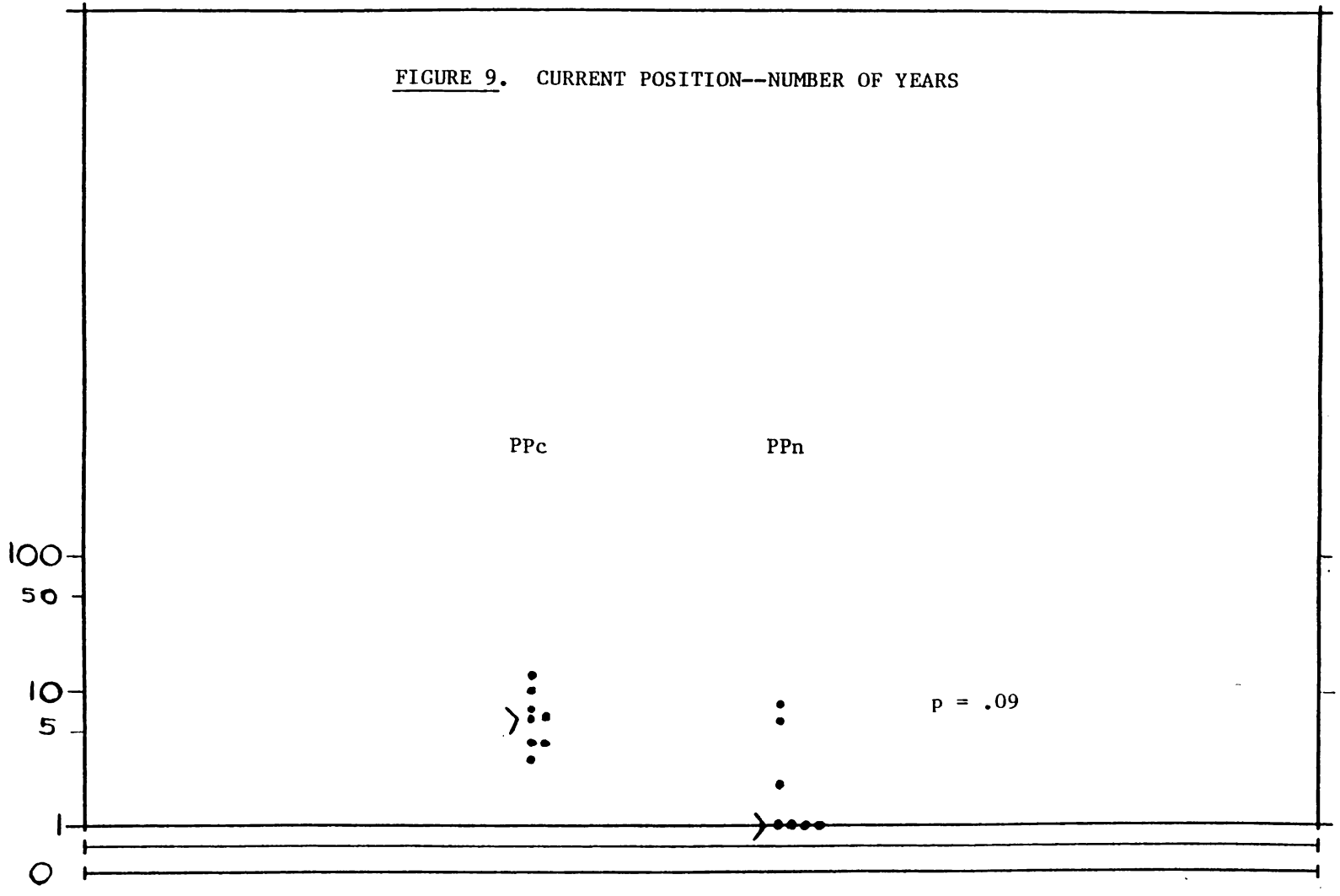
The importance of support and rewards is discussed in the education literature. Sweeney (1982) reviewed eight studies on effective leadership. Three of the eight studies found that principals who support their teachers tend to have more effective schools. In addition, Corbett (1982) studied 14 elementary and secondary schools and found "the key means by which principals were able to maintain teachers' innovative behavior was the provision of incentives." Attention from

the principal and teacher evaluation were commonly used as incentives to maintain change. In her study of ten Precision Teaching projects, Albrecht (1984) found administrative support must be a part of the policy for implementing Precision Teaching programs. Rawers (1983) found that teachers who implemented Precision Teaching in their classroom listed support from the administration as highly important. Since support is important to behavior and the maintenance of programs, support in the form of rewards is important to principals and has an effect on whether they continue to chart.

PPc and the PPn reported average student learning celerations from their charts. Both groups reported a median average celeration of X1.25. Their charts, on the average, showed students learning 25 percent more each week. The extent to which students did or did not improve had no relationship to whether or not principals continued or discontinued charting.

Figure 9 presents the number of years principals have been employed in their current positions. The PPc employment period ranged from 3 years to 12 years with a median of 6 years. The PPn ranged from one to eight years with a median of one year. The difference in medians is large (X6); however, the relationship between the number of years principals have been employed in their current positions as compared to whether or not they continue to chart is not statistically significant ($p = .09$).

FIGURE 9. CURRENT POSITION--NUMBER OF YEARS



Four PPn reported that this was the first year of their current position. Three of these four PPn stopped charting two or more years ago.

Table 12 shows the results to the question asked of the PPn about why they do not chart. Several PPn listed more than one reason for not continuing to chart. Four of the seven volunteered lack of support from others as one reason they did not continue to chart. The next most frequent response was not enough time. No interest was reported by one PPn. Lack of funds was not listed by anyone as relating to whether or not they continued to chart. Two PPn listed other reasons for not charting. They reported lack of need for the kind of information obtained through charting, lack of helpful pinpoints, lack of opportunity to start the program (new job), and limits of charting as their "other" reasons.

TABLE 12

REASONS FOR DISCONTINUING CHARTING

Reasons	PPn*	
	Count	%
Lack of Support from Others	4	57
Not Enough Time	3	43
Other	2	29
No Interest	1	14
Lack of Funds	0	0

*In some cases PPn selected more than one reason.

The Precision Trainers correctly estimated that the PPn would respond most frequently to lack of support from others as the primary reason for not continuing to chart. Every Precision Trainer surveyed in this study has a strong behavioral background with one being a renowned expert in the field. The strength of their behavioral orientation could account for their accurate estimate on lack of support.

Martin and Willower (1981), in a study of how five secondary principals spent their time, found only 17.4 percent was spent on instructional matters. This included tasks indirectly related to instruction such as ordering textbooks and equipment and checking transcripts. With so little time available for supervision of instruction, coupled with the time required to review student charts and/or prepare summary charts and accompanied by lack of rewards from superiors and other staff, it is not difficult to understand why three of seven principals who no longer chart gave "requires too much time" as their reason.

Five of the seven PPn were asked whether they would ever chart again. Four of the five responded affirmatively, and one said, "probably not" due to time limitations. One PPn who responded said that he would chart if the need was great enough to warrant the time and energy. Another PPn made a similar comment by saying that, if there was a special purpose

or project to do, then charting would be used. The other two responded by saying "definitely" and "as soon as I have the opportunity."

When the PPn were asked "what would help you start charting again," the following responses were made:

1. support and contact from people who are using it
2. help with decision-making from charts
3. reducing some of the detail
4. support from superiors
5. information on better pinpoints, e.g., higher order thinking skills
6. better measurement paradigm than the one-minute timing

Question 4

How do principals feel and perceive others to feel about Precision Teaching?

Table 13 shows a comparison of positive and negative feelings across groups. These comparisons do not reveal a statistically significant difference ($p = .22$ for PP to TP and $p = .48$ for PPc to PPn). However, these data are important when grouped with other reports by principals.

All groups reported more positive than negative feelings about Precision Teaching. Ten of the 15 PP reported positive

feelings, and two reported negative feelings. Seven of the 15 TP reported positive feelings while three reported negative feelings. The TP reported more neutral or mixed feelings about Precision Teaching than the PP. Of the eight other feelings reported, the TP reported five, and the PP reported three of these neutral or mixed feelings.

TABLE 13

DISTRIBUTION OF POSITIVE AND NEGATIVE FEELINGS ABOUT PRECISION TEACHING BY PRINCIPALS

	PP	TP	PPc	PPn
Positive Feelings	10	7	7	3
Negative Feelings	2	3	1	1
Other Feelings: (neutral + mixed)	3	5	0	3

When the categories are grouped, 12 of the TP reported feeling positive, neutral or mixed. An example of a comment considered in the mixed category is: "probably more idealistic than realistic but a tremendous idea." Neutral comments were: "ambivalent" and "okay." Positive comments included, "It is the best method I've seen to keep a child on task with the short amount of time we have available."

When the PPc and PPn are compared, seven of the eight PPc reported positive feelings about Precision Teaching. Several

of their comments included: "fantastic" and "incredibly motivating" and "loving, warm, positive continuum."

One PPc reported negative feelings. The one PPc who expressed negative feelings reported that these centered around political concerns that caused him to feel pessimistic. This PPc is principal of a school in Canada.

The PPn group had three report positive feelings and one report negative feelings. The PPc were over two times more positive than the PPn. The PPn were more varied in their responses and less emphatic in the expression of their feelings as evidenced by their neutral and mixed feelings. Interpretation of these data suggest that the PPn are unclear of their feelings and unsure of their decision to discontinue the use of Precision Teaching in their principalship. The PPc are more definitive with their responses. This suggests a clear feeling about their decision to chart.

The PT were asked to estimate how many PP would say others react positively and estimate how many PP would say others react negatively when they first learn about Precision Teaching (see Table 14). The PT estimates were identical to the actual number of PPc who responded with a positive answer concerning the reactions of others to Precision Teaching. The PT estimates of three corresponded with the three PP who confirmed the PT estimate and said people react in positive

ways when they first learn about Precision Teaching. The PT estimates of negative reaction were /2 of the actual number given by PP. Six PP responded with negative answers, and the PT estimated that 12 PP would report that people react negatively to Precision Teaching when they first learn about it. Since the Precision Trainers were given only a positive or negative category and they all responded to the two categories without deviating, their estimates of negative reactions could be interpreted as being similar to the actual responses of the PP if negative was grouped with neutral and mixed.

TABLE 14

DISTRIBUTION OF FEELINGS BY PRINCIPALS ABOUT THE REACTIONS OF OTHERS TO PRECISION TEACHING

Feelings	PT Estimates of	PP	PPc	PPn
Positive	3 (20%)	3 (20%)	3 (37.5%)	0
Negative	12 (80%)	6 (40%)	3 (37.5%)	3 (43%)
Neutral	0	5 (33%)	2 (25%)	3 (43%)
Mixed	0	1 (7%)	0	1 (14%)

A comparison of the PPc to the PPn on how others react initially to Precision Teaching reveals the number of PPn who responded with a positive answer was zero. Three of the eight PPc felt people initially react positively. Three PPn and three PPc felt people initially react negatively. The PPc

group had two principals who felt people react in a neutral way. The PPn had three principals who felt people are initially neutral while one PPn felt people initially react with mixed feelings.

Interpretation of these data suggests that the Precision Trainers and the Precision Principals responded to this question at a very personal level. Perhaps the PPn have felt punished when they try to teach Precision Teaching; thus their feelings are more negative, neutral, and mixed with zero feeling positive. The PPc are variable but with more positive feelings emerging.

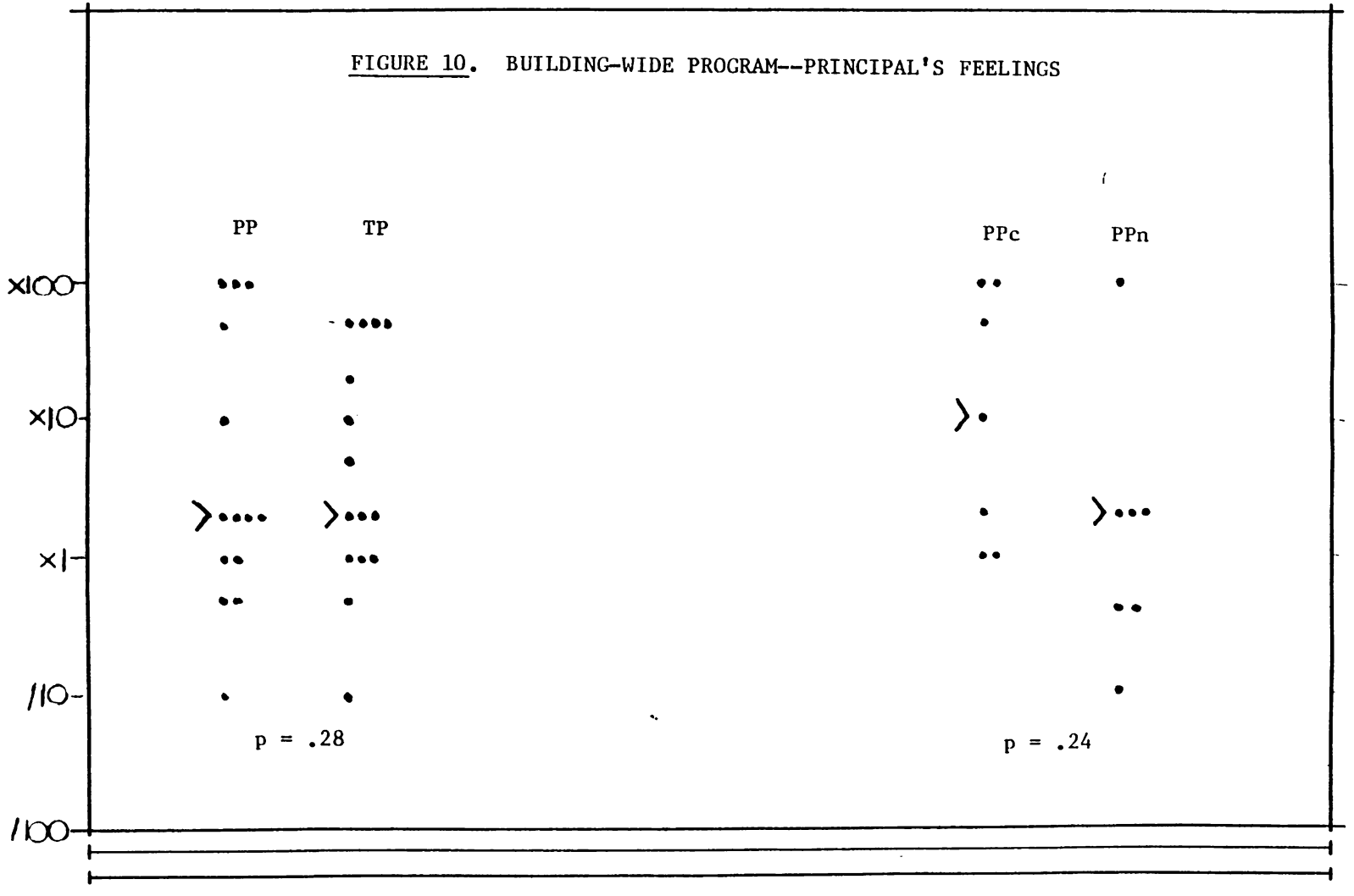
Although the feelings about Precision Teaching and the perceptions of the feelings of others about Precision Teaching do not show differences that are statistically significant between groups, these data are important to the implications for future training programs. More frequent checks on how people feel during the training process might be warranted.

Question 5

What do principals estimate will be their feelings if they were to be the principal of a school where there is a building-wide chart-based program?

Figure 10 shows that the feelings of PPc ranged from X1 (the same) to 100 times better when asked how they would feel if they were to be the principal of a school with a

FIGURE 10. BUILDING-WIDE PROGRAM--PRINCIPAL'S FEELINGS

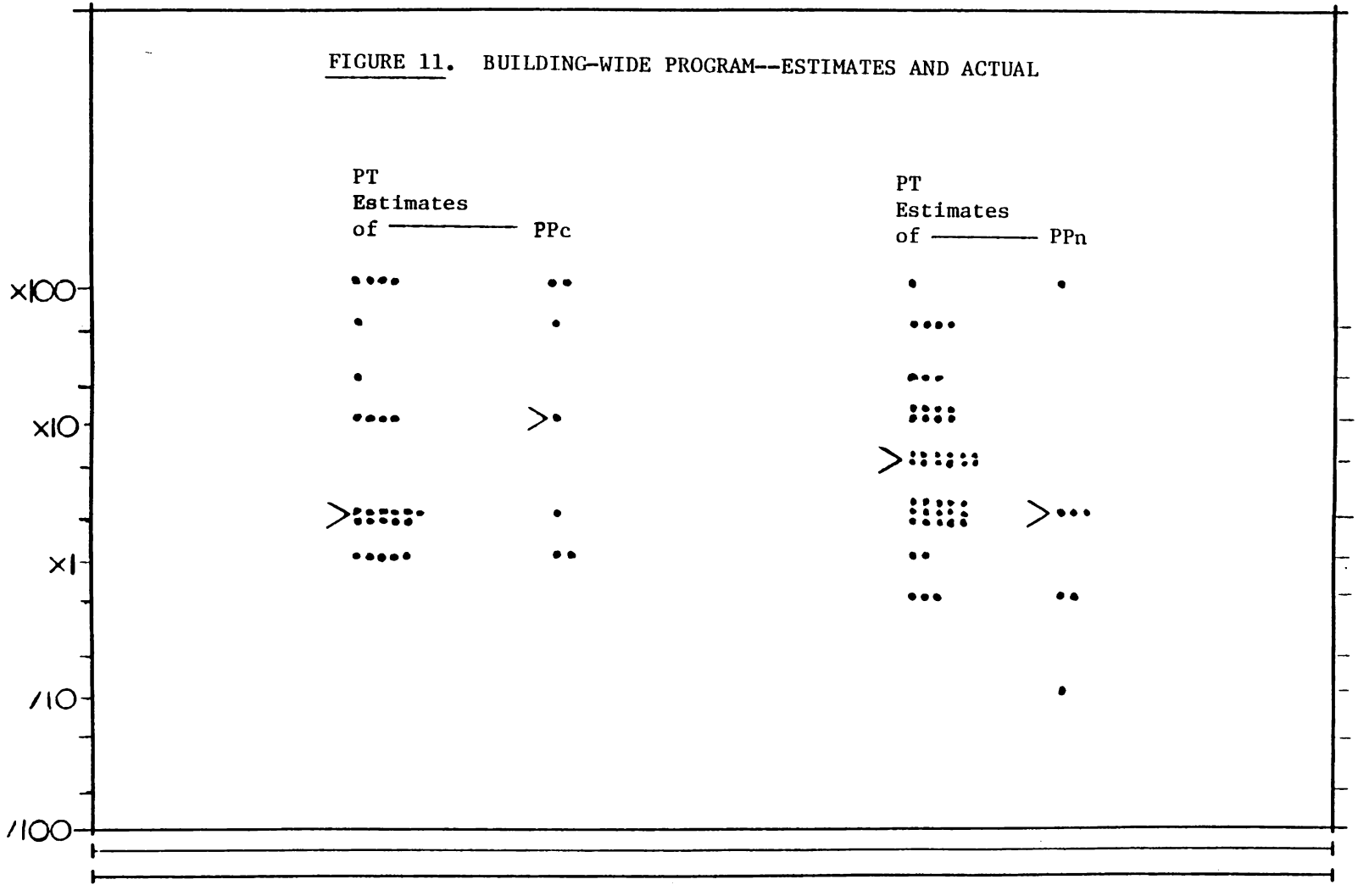


building-wide chart-based program. The one PPc who already had a school with a building-wide chart-based program was not included in the analysis. The median response for the PPc was ten times better. The Precision Principals who no longer chart (PPn) expressed feelings ranging from /10 to 100 times better with two times better being the median response. The large difference between the two medians is X5, i.e., the PPc felt five times more positive than the PPn about a principalship with a building-wide chart-based program. However, this difference was not statistically significant ($p = .24$).

Figure 10 also compares the feelings of all the PP and the TP when asked about being the principal of a school with a chart-based program. The median responses for both groups were feeling two times better. The PP ranged from /10 to feeling 100 times better. The TP ranged from /10 to feeling 50 times better. The difference between these two groups on whether they would feel better or worse if they had a chart-based school is not statistically significant ($p = .28$).

Figure 11 shows the PT estimates on a 13-point multiply scale ranging from 100 times better to 100 times worse on what the response of the PPc and PPn would be when asked how they would feel if they were a principal of a school with a chart-based program. The feelings reported by the PPc regarding a chart-based school and as estimated by the Pt ranged from X1, i.e., stay the same, to 100 times better. The PPc reported

FIGURE 11. BUILDING-WIDE PROGRAM--ESTIMATES AND ACTUAL



they would feel ten times better as principal of a school with a chart-based program; whereas, the PT estimated the PPc would feel only two times better. There is a X5 difference between the median of the estimates of the PT (X2) and the median of the actual values reported by the PPc (X10). The PPc felt five times better than the PT estimated they would feel. Although the PT estimated the PPc would feel better, they underestimated the value or degree a chart-based building would make the PPc feel.

Only two of the PPc reported that being a principal of a chart-based school would make them feel the same (X1). The remaining PPc reported various values of feeling better. These data, combined with their current charting behavior (number of charts a year), support the idea that the PPc have a high level of commitment to Precision Teaching.

Figure 11 also shows the range and median values between the estimates of the PT and the actual values reported by the PPn concerning their feelings about being the principal of a school with a chart-based program. The PT estimates ranged from /5 to 100 times better while the PPn actual responses ranged from /10 to /100 times better. The PT estimated the PPn would feel five times better, and the PPn reported they would feel two times better if their principalships involved building-wide chart-based programs. The PT estimated the PPn

would feel two and a half times better than the PPn reported they would feel if they were to have a principalship in a chart-based building.

Four PPn reported they would feel better if they were principals of chart-based schools. These data, coupled with the fact that 80 percent of the PPn who were asked responded affirmatively when asked if they would chart again, suggest that they could become active charters in the future.

Question 6

Have ideas changed, positions on issues reversed, non-personal administrative or personal administrative behaviors changed, or discoveries been made as a result of charting?

The 15 PP reported that their administrative behaviors have changed as a result of their use of the Standard Celeration Chart (SCC). When asked what changes have been made, some of the administrators responded that they

1. made more objective decisions
2. paid more attention to data in general
3. increased their awareness of add-subtract representation of data
4. changed schedules
5. gathered support from central office for reports that included charts
6. used charts to communicate with others
7. reduced feelings of anger

When asked about the use of the SCC for making discoveries, reversing decisions, or changing ideas, the PPc were quite varied in the number of uses they reported (see Figure 12). The responses ranged from zero ideas, decisions, or discoveries to one principal reporting 130 a year. The responses of the PPn ranged from .2 to 12 a year. The median for the PPc was .65 compared with the median of 1.2 a year of the PPn. This is a difference of X1.8. Overall, the PPn group reported 80 percent more discoveries, reversed decisions, and/or changed ideas through the assistance of the chart than the PPc. However, the difference between the groups is not statistically significant ($p = .44$).

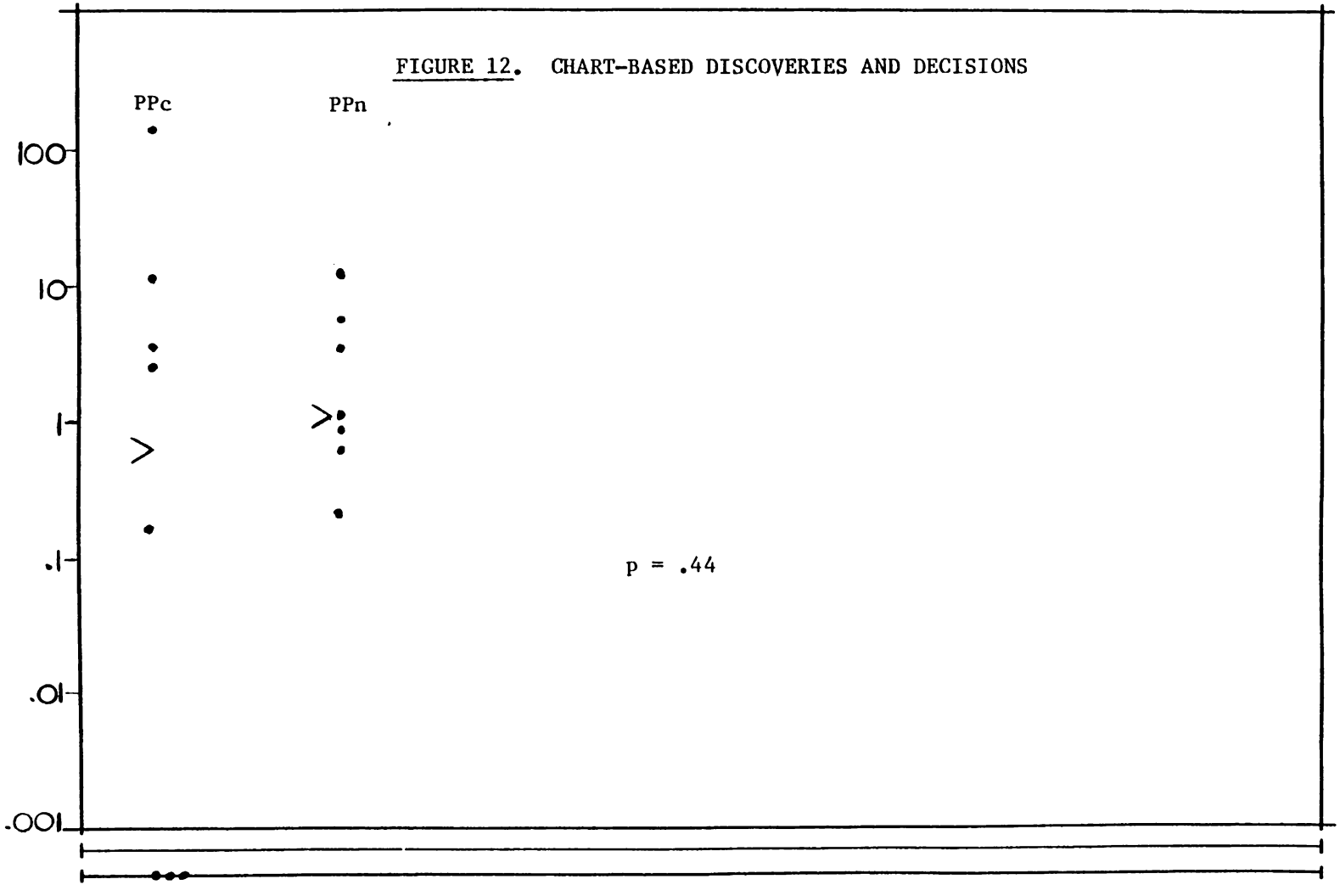
While charting appears initially to help both PPc and PPn make decisions and discoveries, one could speculate that principals are not sufficiently rewarded for making decisions and discoveries. Too few rewards are provided for them to go to the trouble of charting information to assist them in making decisions and discoveries.

Question 7

How do Traditional Principals feel about the types of measurement that are currently being used in the classrooms of their buildings?

Three of the 15 Traditional Principals reported that they currently supervise Precision Teachers in their buildings.

FIGURE 12. CHART-BASED DISCOVERIES AND DECISIONS



This group was not asked to respond to the question regarding current classroom measurement.

Forty-two percent responded that they were satisfied. Fifty-eight percent of the Traditional Principals responded that they were not satisfied with the type of measurement that was used in their classrooms. The dissatisfied TP were asked why they felt that way. The following are their reasons:

1. Procedure does not directly measure students' performance.
2. Measures are very subjective (two respondents).
3. No system, consistency, or standardization of measurement are applied (two respondents).
4. What is being measured might be what the teacher teaches instead of curriculum (two respondents).
5. Procedure leaves too much to chance.
6. Results do not tell what you want to know about the student.
7. Too much percentage is used, particularly when computing grades; students are not rewarded for improvement.

Several principles of Precision Teaching provide direct comparisons to the seven dissatisfactions raised by the Traditional Principals. These limitations, accompanied by their Precision Teaching principle, are presented in Table 15.

TABLE 15

COMPARISON OF REPORTED CLASSROOM MEASUREMENT LIMITATIONS AND RELATED PRECISION TEACHING

Reports of Present Classroom Measurement Limitations	Precision Teaching Principles
1. does not directly measure student performance	1. directly measures student performance
2. very subjective	2. objective way to measure student performance and learning
3. no system, no consistency, not standard	3. data converted to a standard unit of measurement are consistently charted on a standard chart
4. what is measured might be what the teacher is teaching instead of the district curriculum	4. offers no specific principle
5. leaves too much to chance	5. is precise
6. does not tell you what you want to know about student	6. tells performance (frequency), learning (celeration), and whether interventions are effective
7. too much percentage, students not rewarded for improvement	7. student learning (movements per minute per week) is the power; improvement is the focus

When asked about measurement, the Traditional Principals consistently referred to measurement by the format by which students are measured, i.e., teacher-made tests, unit tests, and oral reports. The actual measures of student performance and learning appeared to be considered an implicit part of the measurement format.

Question 8

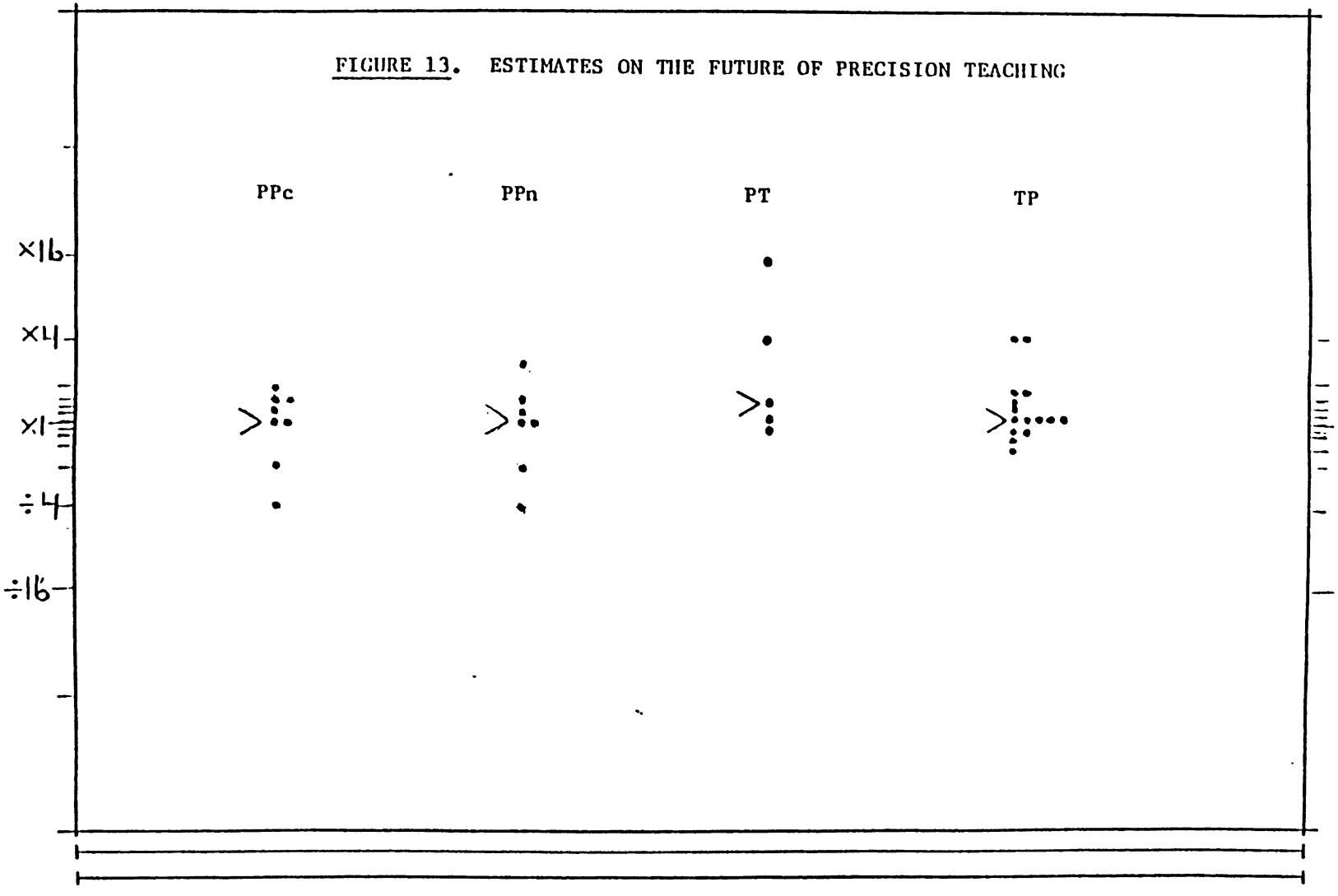
How do principals perceive the future of Precision Teaching?

The TP reported a median celeration at X1, thus estimating that Precision Teaching will maintain its current level over the next five years (see Figure 13). The distribution of responses by the TP ranged from /1.4 to X4 growth every five years.

When the PP are broken into their two groups, PPc and PPn, the median celerations for each group are at X1 every five years. The PPc group has a range of responses between /2 and X2. The responses of the PPn ranged from /4 to X4.

The PT reported the most optimistic estimates about the future of Precision Teaching. The range of responses was /1.25 to X16, and the median celeration was X1.25. The PT feel that Precision Teaching will increase 25 percent in use every five years.

FIGURE 13. ESTIMATES ON THE FUTURE OF PRECISION TEACHING



One PT was bizarrely optimistic with a report of X16 growth of Precision Teaching every five years. If this data point is removed from the distribution for PT, the median celeration moves down to X1.1, bringing the PT group even closer to the median X1 of the other three groups.

The founder of Precision Teaching interprets these data as indicating that "schools are not interested in student learning. The principals know it, and the trainers are hanging on. . . ." (Lindsley, personal communication, July 1986). This researcher agrees that this is one possible interpretation of these data, which exemplify the difference between words and action. In this case, words and nonaction are a more appropriate distinction. There is a proliferation in educational literature about the need to improve teaching and student achievement; yet, all of this rhetoric does not impact on changing aspects of the instructional program so that learning occurs more effectively and efficiently. The importance of student learning is stressed in the literature but less so in practice. If, in the future, student learning is stressed more in practice, Precision Teaching may be used more widely.

Reliability

Interrater Reliability

In Table 16 the data on the reliability of the answers to the questionnaire for Precision Principals are presented.

TABLE 16

RELIABILITY OF ANSWERS TO QUESTIONNAIRE: PRECISION PRINCIPALS

Interviewee[1]	% of Interview Sampled[2]	Number of Agreements[3]	Number of Disagreements[4]	% of Agreements
PP1	100	39	2	95
PP2	100	30	1	96
PP3	100	32	3	91
PP4	100	46	2	96
PP5	100	64	0	100
PP6	100	40	0	100
PP7	100	40	2	95
PP8	100	34	2	94
PP9	20	9	0	100
PP10	27	21	1	95
PP11	100	61	3	95
PP12	100	44	3	94
PP13	100	23	1	96
PP14	45	20	1	95
PP15	100	53	3	95
		556	24	$\bar{X}$ = 96

[1]PP refers to Precision Principal and the number refers to their position in alphabetical order.

[2]The audiotapes for PP9, PP10, and PP14 were inaudible except for the percent of interview items reported.

[3]An agreement was counted each time both listeners coded an answer the same way. Questions for which no answers were given, could not be coded, or which were not applicable were not included in the count.

[4]A disagreement was counted each time listeners had entered different codes (e.g., one listener coded an answer as a negative statement and the other as a neutral statement).

[5]Percent agreement was calculated by dividing agreements by agreements plus disagreements and multiplying the quotient times 100.

Reliability was computed on 100 percent of the answers given by 12 of the 15 principals in the sample. Due to recording problems, only 20 percent, 27 percent, and 45 percent of the answers to questions asked of Precision Principals 9, 10, and 14, respectively, had comparison records. The answers given to the remaining questions were inaudible and/or were not recorded and could not be used in determining an overall reliability for those principals. In addition, questions for which no answers were given could not be coded or which were not applicable as a result of answers to an earlier question were not included in the reliability counts. On the items remaining, an agreement was counted each time both listeners coded an answer the same way. A disagreement was counted each time listeners had entered a different code. The number of agreements ranged from 9 to 64, and the number of disagreements ranged from zero to three. The reliability of answers by each principal was determined by dividing the agreements by the number of agreements plus disagreements and multiplying the quotient by 100. The reliability assessments on the Precision Principals ranged from 91 percent to 100 percent with an overall mean of 96 percent.

In Table 17 the reliability data on the answers given to the questions asked of the Traditional Principals are presented. Because of inaudible tapes, no reliability assessments

TABLE 17

RELIABILITY OF ANSWERS TO QUESTIONNAIRE:
TRADITIONAL PRINCIPALS

Interviewee[1]	% of Interview Sampled[2]	Number of Agreements[3]	Number of Disagreements[4]	% of Agreements
TP1	100	20	0	100
TP2	100	19	1	95
TP3	0	--	-	--
TP4	0	--	-	--
TP5	100	19	0	100
TP6	100	22	0	100
TP7	100	18	0	100
TP8	100	22	0	100
TP9	100	21	1	95
TP10	0	--	-	--
TP11	100	38	1	97
TP12	0	--	-	--
TP13	100	19	1	95
TP14	0	--	-	--
TP15	100	22	0	100
		220	4	$\bar{X}$ = 98

[1]TP refers to Traditional Principal, and the number refers to the order in which they were interviewed.

[2]The audiotapes of TP3 and TP4 were inaudible. No reliability assessments were made on TP 10, 12, and 14 due to the high percent agreement on TP 1, 2, 5, 6, 7, 8, and 9.

[3]An agreement was counted each time both listeners coded an answer the same way. Questions for which no answers were given, could not be coded, or which were not applicable were not included in the count.

[4]A disagreement was counted each time listeners had entered a different code (e.g., one listener coded an answer as a negative statement and the other as a neutral statement).

[5]Percent agreement was calculated by dividing agreements by agreements plus disagreements and multiplying the quotient times 100.

were possible on TP 3 and 4. As a result of the high percentage of agreement on TP 1, 2, 5, 6, 7, 8, and 9, only odd-numbered interviews (TP 11, 13, and 15) were recorded, and reliability on even-numbered interviews (TP 10, 12, and 14) was not assessed. Once again, questions that were not answered or not applicable and answers that could not be coded were not included in the reliability counts. As before, the answers to the remaining questions were counted as agreements each time both listeners coded an answer the same way and as disagreements each time listeners had entered different codes.

The number of agreements ranged from 18 to 38, and the number of disagreements ranged from one to zero. Percent agreement was calculated by dividing agreements by agreements plus disagreements and multiplying the quotient by 100. The reliability assessments on the Traditional Principals ranged from 90 percent to 100 percent with an overall mean of 98 percent.

Interview-Reinterview Reliability

In Table 18 the data on the reliability of answers to the questionnaire in the first interview and the second interview are presented. Reliability was computed on 100 percent of the answers given by three of the thirty principals representing the Precision Principal and Traditional Principal groups. One TP and two PP were reinterviewed.

TABLE 18

RELIABILITY OF INTERVIEW-REINTERVIEW

	PP4	PP10	TP1
Total Number of Answers	64	64	20
Exact Reliability			
Number of Exact[1] Agreements	47	42	16
Number of Exact Disagreements	17	22	4
Percent of Exact Reliability	73%	66%	80%
Essential Reliability			
Number of Essential[2] Agreements	54	53	18
Number of Essential Disagreements	10	11	2
Percent of Essential Reliability	84%	83%	90%

[1]Exact as defined in the narrative means the principals gave an identical answer to the question at both the initial interview and at the reinterview.

[2]Essential as defined for each interview question means the principal gave an answer to the question at the initial interview and at the reinterview that varied within a range so narrow as to be fundamentally the same.

Exact and essential reliability for three principals are presented. Exact reliability (i.e., answers given in the first interview had to be identical to answers given in the second interview) ranged from 66 percent to 80 percent with a median of 73 percent. Essential reliability was also calculated. Essential reliability (i.e., answers to questions at both the initial interview and at the reinterview had to vary within a range so narrow as to be fundamentally the same) ranged from 83 percent to 90 percent with a median of 84 percent.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

This study explored the use of Precision Teaching by 15 principals trained in Precision Teaching. The primary purpose was to identify variables contributing to their continuance or discontinuance of standard celeration charting. Telephone interviews were conducted to determine which principals have continued and which principals have discontinued charting. Seven of the 15 principals discontinued charting; eight have continued to chart. One charting principal is at maximum level with all teachers and students using Precision Teaching.

Fifteen other principals not trained in Precision Teaching were interviewed by telephone to determine their satisfaction or dissatisfaction with current measurement practices in their classrooms. These principals were given specific information regarding Precision Teaching, and their reactions, feelings, and predictions were examined.

Five Precision Teaching trainers were interviewed by telephone to collect their estimates regarding the results

of this study. These estimates were compared with the actual outcomes.

Factors and Findings

Factors found related to discontinuing Precision Teaching by principals are:

1. Lack of support or rewards from superiors, and/or others
2. Lack of time
3. Need for information specific to administrative applications

Factors found related to continuing Precision Teaching by principals are:

1. Receiving support or rewards from superiors, family and/or others
2. Being trained through a model that included delivery over successive days or on the job
3. Maintaining or supervising an instructional program with a high student-chart ratio

Summary of findings from principals who have not been trained in Precision Teaching:

1. Principals were satisfied and dissatisfied with the measurement used in the classrooms of their buildings.

2. Principals' dissatisfication with measurement might be eliminated through the application of Precision Teaching principles.
3. Principals had positive, neutral, and mixed feelings about Precision Teaching.
4. Principals estimated that they would feel better than they do now if they were principals of chart-based school programs.

Summary of findings from trainers of Precision Teaching:

1. Trainers made as many accurate estimates about principals who chart as they did about principals who dropped charting.
2. Trainers responded with more optimism about the feelings and estimates of the principals who continue to chart than those principals themselves.
3. Trainers reported on the future of Precision Teaching with the most optimistic view.

Conclusions

The following conclusions are derived from the findings and literature reviewed for this study:

1. Student learning is viewed as important, i.e., should be done; but other aspects of the role of the principal are more

compelling, i.e., have to be done. The net result is that student learning is not assessed by a system that monitors daily performance or weekly improvement.

2. Unless future circumstances change, training programs in Precision Teaching can expect that approximately half of those trained will implement the procedures and continue charting, and half will either not implement Precision Teaching procedures or implement the procedures and then, over time, drop charting.
3. The relative strength of rewarding, punishing, and ignoring on the part of superiors, family, and others is important to maintain charting.
4. Teachers need additional training in administrative applications when they move into a principalship.
5. Principals are innundated with situations that require reactions. Time is not available to be proactive with respect to important dimensions of the position, e.g., implementing Precision Teaching in supervision

of the instructional program or in other aspects of administration.

6. Application of Precision Teaching in the noninstructional aspects of the role of the principal needs clarification and more emphasis placed upon it.
7. Some principals do not feel comfortable with their decision to stop charting.

Suggestions for Increasing Use of Precision Teaching by Principals

Training

Training programs should include a practicum component so that participants receive direct supervision while learning the procedures and skills in Precision Teaching. The practicum could be on-the-job related or built into a college course or workshop situation.

As a part of the training program, a "buddy" system or other type of "network" for newly trained principals could be established. The training program should include direct participation by superiors. Developing the support of superiors is vital to the continued use of Precision Teaching.

Supervision of Instructional Programs

Whether or not principals encourage or require teachers to chart, a reward system needs to be developed. Rewards in

the form of support and encouragement may be all that is necessary to reinforce charting and learning. However, if necessary, principals should be prepared to develop a more powerful system of tangible rewards.

Since Precision Teaching has been purported to take "too much time," ways to reduce the time it takes to implement Precision Teaching into the instruction program seem to be needed. Reducing the amount of time required to implement Precision Teaching in the classroom has been addressed. During 1967, one-minute samples were introduced. What initially began as a procedure to promote efficiency in data collection turned into a powerful outcome. The issue of fluency (Haughton, 1972) and the effect on learning emerged from the one-minute timings.

Reducing the time required to apply Precision Teaching to the principalship may not be the best way to promote its use. The quality of Precision Teaching cannot be sacrificed. Emphasis needs to be placed on reducing the amount of time a principal spends on tasks not directly related to instruction. In this way more time is available for planning and implementing Precision Teaching.

Administration

Just as reward systems need to be developed for teachers and students, principals need to be rewarded by their superiors for generating information and making decisions and discoveries.

For example, a principal could use the chart to display information on expenditures clearly to show the effects of careful budgeting.

Successful and continued use of charting depends on knowing how to chart and what to chart. Principals need to select judiciously what to chart. Since the amount of time available for any one task is limited, principals need to select pinpoints that will provide only the information needed to make effective decisions. As in the example above, charting the budget on a monthly chart may be more beneficial for making decisions than monitoring the number of phone calls made and received each day or week. Judgments should be made on what pinpoint is most important at what time. Certain pinpoints have greater relevance for effective decision making at one time than at another time.

Recommendations for Further Research

Comparisons and monitoring of administrative use of Precision Teaching need to continue. A systematic replication of this study with a larger sample of the Precision Principals is necessary to validate the results of the current study.

Administrative support from principals is a key factor in continued use of Precision teaching by teachers. Likewise, support from district administrators is also a key factor in continued use by principals. Future studies could refine

this area and identify discrete variables that affect durability and continuation of Precision Teaching by administrators and teachers.

A longitudinal study of charting principals would result in information based on actual counts and records of information rather than recall. Visits to the sites of practicing Precision Principals could refine this search.

Studies in the use of Precision Teaching have focused on teachers, principals, and programs. The extent of superintendent and board involvement has not been assessed. Future studies should focus on the extent that superintendents and boards of education support or do not support Precision Teaching.

A study of the different training programs, i.e., college courses, on-the-job consultation, workshops, should be explored. Not only should the maintenance of Precision Teaching by participants be studied but the internal aspects of each training program should be examined to yield information on variables that effect the continuation of Precision Teaching by administrators and teachers.

Sharing of information is integral to Precision Teaching. The system grows in sophistication and use through the combined efforts of many. Future research in Precision Teaching should focus on further identification of variables that affect and maintain the use of charting at all levels in education. The power of Precision Teaching has been proven. The challenge now is how to pass the test of endurance.

REFERENCES

REFERENCES

Acheson, K. A., & Gall, M. D. (1980). Techniques in the clinical supervision of teachers. New York: Longman, Inc.

Albrecht, P. L. (1984). Summary of ten major school precision teaching programs. Unpublished doctoral dissertation, University of Kansas.

All, P. (1977). From get truckin' to jaws, students improve their learning pictures. Unpublished master's thesis, University of Kansas.

Austin, G. R. (1979). Exemplary schools and the search for effectiveness. Educational Leadership, 37 (1), 10-14.

Beck, R. J. (1981). Precision teaching training: A follow-up study, 1975-1981. Paper presented at Precision Teaching Conference--Big Sky III, Kalispell, MT.

Benjamin, R. (1981). Making schools work. New York: The Continuum Publishing Company.

Berquam, S. (1983). Administrative charts. Journal of Precision Teaching, 4 (1), 21-22.

Bower, R. (1985). Self-charting: Giving kids a chance. Journal of Precision Teaching, 6 (1), 14-20.

Brookover, W. B., & Lezotte, L. W. (1977). Changes in school characteristics coincident with changes in student achievement. East Lansing: Michigan State University, College of Urban Development.

Calkin, A. B. (1984). Administrative behavioral charting. Paper presented at Seventh Annual Precision Teaching Conference, Park City, Utah.

Corbett, H. D. (1982). Principals' contributions to maintaining change. Phi Delta Kappan, 64 (3), 190-192.

Duke, D. L. (1982). Leadership functions and instructional effectiveness. NASSP Bulletin, 66 (456), 1-10.

Eaton, M., & Fox, S. (1983). Using precision teaching to teach precision teaching. Journal of Precision Teaching, 3 (4), 91-96.

Edmonds, R. R. (1979a). A discussion of the literature and issues related to effective schooling (Vol. 6). St. Louis, MO: Cemrel, Inc.

Edmonds, R. R. (1979b). Effective schools for the urban poor. Educational Leadership, 37 (1), 15-17, 20-25.

Edmonds, R. R. (1982). Programs of school improvement: An overview. Educational Leadership, 40 (3), 4-7.

Fallon, B. J. (1979). Principals are instructional leaders: Hit or myth? NASSP Bulletin, 63, 67-71.

Farley, J. (1985). Making time for instructional leadership. Thrust, 14 (4), 38-39.

Flanagan, P. H. (1982). Improved student learning through decentralizing curricular decisions. Unpublished doctoral dissertation, University of Kansas.

Frey, J. H. (1983). Survey research by telephone. Beverly Hills, CA: Sage Publications.

Gay, L. (1976). Educational research: Competencies for analysis and application. Columbus, OH: Charles E. Merrill.

Hager, J. L., & Scarr, L. E. (1983). Effective schools--effective principals: How to develop both. Educational Leadership, 40 (5), 38-40.

Haughton, E. C. (1971). Great gains from small starts. Teaching Exceptional Children, 3 (3), 137-142.

Haughton, E. C. (1972). Aims growing and sharing. In J. B. Jordan & L. S. Robbins (Eds.), Let's try doing something else kind of thing. (pp. 20-39). Arlington, VA: The Council for Exceptional Children.

Haughton, E. C., Maloney, M., & Desjardins, A. (1980). The tender loving care chart. Journal of Precision Teaching, 1 (2), 22-25.

Hunter, M. (1985). What's wrong with Madeline Hunter? Educational Leadership, 42 (5), 57-60.

Jacobson, P. B., Logsdon, J. D., & Eigman, R. R. (1973). The principalship: New Perspectives. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Jordan, J. B., & Robbins, L. S. (Eds.). (1972). Let's try doing something else kind of thing. (pp. vii-ix). Arlington, VA: Council for Exceptional Children.

Kunzelmann, H. P. (1972). For successful program maintenance look at the data first. In J. B. Jordan & L. S. Robbins (Eds.). Let's try doing something else kind of thing (pp. 118-127). Arlington, VA: Council for Exceptional Children.

Kyte, G. C. (1952). The principal at work. Columbus, OH: Ginn and Company.

Lemley, R. E. (1983). The principal's dozen: Effectiveness reexamined, 67 (459), NASSP Bulletin, 107-110.

Lindsley, O. R. (1964). Direct measurement and prosthesis of retarded behavior. Journal of Education, 147, 67-81.

Lindsley, O. R. (1972). From Skinner to precision teaching: The child knows best. In J. B. Jordan & L. S. Robbins (Eds.), Let's try doing something else kind of thing. (pp. 1-11). Arlington, VA: Council for Exceptional Children.

Lindsley, O. R. (1979). Supervision of Teaching (Lectures). University of Kansas.

Lovitt, T. C. (1977). In spite of my resistance . . . I've learned from children. Columbus, OH: Charles E. Merrill.

MacKenzie, G. N., & Corey, S. M. (1954). Instructional Leadership. New York: Columbia University.

Madden, J. V., Lawson, J., & Sweet, R. (1976). School effectiveness study: State of California. Sacramento, CA: California Department of Education.

Maloney, M. (1982). Teaching the daily standard behavior chart: A direct instruction approximation. Journal of Precision Teaching, 2 (4), 11-30.

Mangieri, J. N., & Arnn, J. W. (1985). Excellent schools: The leadership functions of principals. American Education, 21 (3), 8-10.

Martin, W., & Willower, D. (1981). The managerial behavior of high school principals. Educational Administration Quarterly, 17 (1), 69-90.

McGreevy, P. (1984). Frequency and the standard celeration chart: Necessary components of precision teaching. Journal of Precision Teaching, 5 (2), 28-36.

Miller, J. E., & Calkin, A. B. (1980). Using precision teaching in a secondary science class. Journal of Precision Teaching, 1 (2), 10-17.

NASSP develops positions on national reports of American ed. (1983). NASSP NewsLeader, 31 (1), 1.

Pavan, B. N. (1985, April). Clinical supervision: Research in schools using comparative measures. Paper presented at the American Education Research Association Conference, Chicago, IL.

Pennypacker, H. S., Koenig, C. H., & Lindsley, O. R. (1972). Handbook of the standard behavior chart. Kansas City, KS: Precision Media.

Pohland, P. A. (1976, April). Perspectives on instructional supervision: The model muddle. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Precision teaching in perspective: An interview with Ogden R. Lindsley (1971). Teaching Exceptional Children, 3 (3), 114-119.

Rawers, L. J. (1983). Precision teaching: Advancing student achievement through daily drill and measurement. OSSC Bulletin, 26 (9), 1-45.

Rippey, R. M. (1983). Evaluating teaching. Educational Psychologist, 18, 25-32.

Rutter, M., Maughan, B., Mortimore, P., & Ouston, J. (1979). Fifteen thousand hours. Cambridge, MA: Harvard University Press.

Shoemaker, J., & Fraser, H. W. (1981). What principals can do: Some implications from studies of effective schooling. Phi Delta Kappan, 63 (3), 178-182.

Skinner, B. F. (1953). Science and human behavior. New York: The Free Press.

Smyth, W. J. (1980). The principal as an educational leader: To be, or not to be? The Australian Administrator, 1 (1), 1-4.

Snyder, K. J. (1983). Instructional leadership for productive schools. Educational Leadership, 40 (5), 32-37.

Starlin, C. M. (1971). Peers and precision. Teaching Exceptional Children, 3 (3), 106-110.

Sullivan, C. G. (1980). Clinical supervision: A state of the art review. Alexandria, VA: Association for Supervision and Curriculum Development.

Sweeney, J. (1982). Research synthesis on effective school leadership. Educational Leadership, 39 (9), 346-352.

Wellisch, J. B., McQueen, A. H., Carriere, R. A., & Duck, G. A. (1978). School management and organization in successful schools. Sociology of Education, 51 (3), 211-226.

White, O. R. (1986). Precision teaching/precision learning. Exceptional Children, 52 (6), 522-534.

Wolcott, H. F. (1973). The man in the principal's office: An ethnography. New York: Holt, Rinehart and Winston.

Wood, D. L., & Fisher, D. (1980). Precise program evaluation using learning picture reports or "you oughta be in the pictures." Journal of Precision Teaching, 1 (1), 2-8.

APPENDIX A

Questionnaires

PRECISION PRINCIPAL

INITIAL INTERVIEW QUESTIONNAIRE

NAME_____ TELEPHONE NUMBER: _____WORK

_____HOME

DATE OF INTERVIEW:_____ ADDRESS:_____

_____

NEXT CONTACT: DATE_____TIME_____PLACE_____

1. Please name as many principals as you can who have been trained in Precision Teaching?

2. What would you like to learn from principals who have been trained in Precision Teaching?

PRECISION PRINCIPAL

FINAL INTERVIEW QUESTIONNAIRE

NAME:_____ DATE:_____

INTERVIEW LENGTH:
ENDING TIME _____
BEGINNING TIME _____
TOTAL TIME _____

TAPED: YES___ NO___

1. Present Position: EL. ___ JH___ HS___ K-12 ___

   Public___ Private___

   Regular___ Special Purpose ___

   Date present position began_____

   Previous Position: Type_____

   Beginning Date_____Ending Date_____

2. Date of Birth_____
   Sex_____

3. Precision Teaching Training:
   Position during initial training_____
   Approximate date of initial training_____
   Type of training: workshop___ length of workshop_____
   college course __ undergrad___ grad___
   other_____dissertation___
   thesis___
   Date of any follow-up training _____

4. Precision Teaching Charting:
   Total number of years used PT charting____or months___
   Do you use Precision Teaching charting in your present principalship? Yes___ No___

If YES, go to the next page. If NO, go to page 4.

5. If YES:

Supervise Instructional Charts: Yes___ No ___

_____total number of teachers in building
_____total number of Precision Teachers in building
_____number of teachers who put the .'s and x's on the students' charts
_____total number of charts
_____number of acceleration charts
_____number of deceleration charts
_____date first began implementing charting
_____estimate number of teachers when charting first started
_____average celeration of number of teachers who chart learning since first began
_____average celeration on acceleration charts
_____average celeration on deceleration charts

_____total number of students in building
_____total number of students who are charted
_____number of students when charting started
_____average celeration of number of students who have charts of their learning
_____number of students who chart their own learning

Yes___ No___ Do you look at the instructional charts?
How often:___weekly ___monthly ___yearly

Yes___ No___ Do you make summary instructional charts:
_____average celeration

Yes___ No___ Are there other records of effectiveness?
_____Grade Level Gains
_____Achievement Scores
If so, what are the results:

What academic behaviors are counted and charted for students?

What do you do as an administrator to encourage charting in your building?

Supervise Management Charts: ___Yes ___No

_____Total number of management charts
_____Date charts began
_____Number of charts when first began charting
_____Average celeration of number of management charts over past 6 months
_____Average acceleration on management charts
_____Average deceleration on management charts

What behaviors are counted and charted:

Personal Charts:___Yes ___No Do you keep personal charts on your own administrative behavior?

_____Total number of personal administrative charts
_____Date began
_____Initial number of charts
_____Average celeration of number of personal administrative charts over last 6 months
_____Average acceleration on personal administrative charts
_____Average deceleration on personal administrative charts

Do you chart ____daily, ____weekly, ___yearly? Do you find one kind of charting better for personal administrative behavior decision-making than another?
___Yes ___No. If so which one :

What personal administrative behaviors are you charting?

(Continue on to page 5, number 7)

6. If NO:
   Number of students in your building _____
   Number of teachers in your building _____
   When did you chart: approximate beginning date_____
   approximate ending date_____

   What was your position when you charted:_____

   Estimate the number of charts you kept:_____
   Instructional: ___Yes ___No
   Management: ___Yes ___No
   Personal Administrative Behavior: ___Yes ___No

   Average celeration on charts _____

   Which of the following describes why you do not continue to chart or encourage others to chart?
   ___not enough time ___lack of funds __no interest
   ___lack of support from others ___other

   What, if anything, would help motivate, stimulate or provide reinforcement for you to start charting again?

   Will you ever chart again? ____Yes ____No

7. Decisions by Charting

___Yes ___No Has charting changed any of your personal administrative behavior? If so, please describe the changes:

___Yes ___No Has charting changed any of your personal non-administrative behavior? If so, please describe the changes:

Has charting changed any ideas or reversed any positions? (i.e., you thought one thing but found it not to be true)
___Yes ___No

_____Estimate the number of changed ideas
_____Estimate the number of reversed positions

Please describe the changed ideas:

Please describe the reversed decisions:

___ Yes ___No Did you make any discoveries by charting?

_____Estimate the number

If so, please describe the discoveries:

8. Rewards

Were you ___rewarded, ___ignored, or ___punished for charting by your superiors?

Were you ___rewarded, ___ignored, or ___punished for charting by others?
If so, who: (positions, not names)

Were you ___rewarded, ___ignored, or ___punished for charting by your immediate family members?

9. Feelings About Precision Teaching:

Using a word or words that describes emotion, tell how you feel about Precision Teaching:

How do you feel others react when they first learn about Precision Teaching:

____hopeful	____upset
____happy	____putdown
____motivated	____Other describe:

10. Chart-Based School

If you could have a chart decision-based school, how would you feel compared to how you feel now:

Better Same Worse

___same X1 ___2X better ___ X5 better ___X10 better

___20X better ___50X better ___100X better

___/2 as good ___/5 as good ___/10 as good

___/20 as good ___/50 as good ___/100 as good

If you could have a Precision Teaching program building-wide, estimate what the average building-wide celeration would be:

Increase Decrease Stay the Same

___/100 ___/50 ___/20 ___/10 ___/5 ___/2

___X1 ___X2 ___X5 ___X10 ___X20 ___X50

___X100

How much could you increase average celeration per week?

___/100 ___/50 ___/20 ___/10 ___/5 ___/2 ___X1

___X2 ___X5 ___X10 ___X20 ___ X50 ___X100

11. Your Building

In your building,(___Precision Teaching ___Non-Precision Teaching) estimate the average building-wide weekly correct acceleration:

___X1.0 ___X1.1 ___X1.25 ___X1.4 ___X2 ___X4

___X16

In your building, (___Precision Teaching ___Non-Precision Teaching) estimate the average building-wide weekly deceleration:

___/16 ___/4 ___/2 ___/1.4 ___/1.25 ___/1.1

___/1.0

12. Future

Estimate what you feel will be the acceleration of Precision Teaching over the next five years:

Increase Decrease Stay the Same

___X16 ___X4 ___X2 ___X1.4 ___X1.25 ___X1.1

___X1 ___/1.1 ___/1.25 ___/1.4 ___/2 ___/4

___/16

___Yes ___No Will instructional decision making rules continue to be based on learning pictures? Please comment:

TRADITIONAL PRINCIPAL

INTERVIEW QUESTIONNAIRE

NAME_____ TELEPHONE NUMBER _____work

_____home

DATE OF INTERVIEW_____ ADDRESS_____
ENDING TIME:_____
BEGINNING TIME:_____ _____
TOTAL TIME _____ _____

TAPED: YES ___ NO ___

1. Present Position
   EL ___ JH___ HS___ K-12___
   Public ___ Private ___
   Regular ___ Special Purpose___
   Date Present Position Began_____

2. Previous Position
   Type _____
   Beginning Date_____ Ending Date _____

3. Date of Birth _____
   Sex_____

4. Do you have teachers who use the standard celeration chart? _____YES _____NO

   If YES, go on to next question. If NO, go to page 4, question 7.

5. If YES:

   Instructional Charts: Yes___ No___

   _____total number of teachers in building
   _____total number of Precision Teachers in building

_____number of teachers who put the .'s and x's on students' charts
_____total number of charts
_____number of acceleration charts
_____number of deceleration charts
_____date first began implementing charting

_____total number of students in building
_____total number of students who are charted
_____number of students who chart their own learning

Yes ___ No___ Do you look at the instructional charts?
How often:___weekly ___monthly ___yearly

Yes ___ No___ Do you make summary instructional charts?
_____average celeration

Yes ___ No___ Are there other records of effectiveness?
_____Grade Level Gains
_____Achievement Levels
If so, what are the results:

What academic behaviors are counted and charted for students:

What do you do as an administrator to encourage charting in your building?

Management Charts: ___ Yes ___No

_____Total number of management charts
_____Date charts began
_____Number of charts when first began
_____Average celeration of number of management charts over last 6 months
_____Average celeration on management charts
_____Average deceleration on management charts

What management behaviors are counted and charted?

6. Decisions by Charts

___Yes ___No Have you changed any of your personal administrative behavior as a result of teachers in your building who chart? If so, please describe the changes:

___Yes ___No Have you changed any of your personal non-administrative behavior as a result of teachers in your building who chart? If so, please describe the changes:

Has charting changed any ideas or reversed any positions? (i.e., you thought one thing but found it not to be true)
___Yes ___No

_____Estimate the number of changed ideas
_____Estimate the number of reversed positions

Please describe the changed ideas:

Please describe the reversed decisions:

Did you make any discoveries from your teacher's charts?
___Yes ___No

_____ Estimate the number and please describe them:

(GO ON TO QUESTION 8)

7. IF NO,

_____Total number of teachers in your building

_____Total number of students in your building

What type of measurement is used for student performance and learning in your building

Are you satisfied with this measurement? ___Yes ___No
If not: Why?

___Yes ___No Are there records of effectiveness?

_____Grade Level Gains

_____Achievement Scores

If so, what are the results:

8. Precision Teaching

Do you know about Precision Teaching ___Yes ___No

(Read paragraph about Precision Teaching to those who answered either yes or no)

8. Feelings:

Using a word or words that describe(s) emotion, tell how you feel about Precison Teaching:

9. Chart-Based School

If you could have a chart decision based school, how would you feel compared to how you feel now: SAME, BETTER, WORSE

To put a value on how much (better worse) you would feel, please select one of the following:

___same X1 ___2X better ___5X better

___10X better ___20X better ___50X better

___100X better ___/2 as good ___/5 as good

___/10 as good ___/20 as good ___/50 as good

___/100 as good

If you had a Precision Teaching program building-wide, estimate how much you could increase the total amount of content learned per year? INCREASE DECREASE STAY THE SAME
Please select one of the values to indicate (how much more how much less) you would feel:

___</100 times as much ___/100 times as much

___/50 times as much ___/20 times as much

___/10 times as much ___/5 times as much

___/2 times as much ___x1 no increase, stay the same

___2X more ___5X more ____10X more ____20X more

___50X more ___100X more ___>100X more

9. Future:

Estimate what you feel will be the acceleration of Precision teaching over the next five years. Will it INCREASE DECREASE STAY THE SAME

How much:

___X1 ___16X more ___4X more ___2X more ___1.4X more

___1.25X more ___1.1 X more ___/1.1 as much

___/1.25 as much ___/1.4 as much ___/2 as much

___/4 as much ___/16 as much

PRECISION TRAINER

INTERVIEW QUESTIONNAIRE

NAME_____ TELELPHONE NUMBER _____work

POSITION_____ _____home

DATE OF INTERVIEW_____ ADDRESS_____

LENGTH OF INTERVIEW:
ENDING TIME _____ _____

_____

BEGINNING TIME _____

TOTAL TIME _____

1. _____How many of the 15 Precision Principals interviewed will report that they are still charting at this time?

2. _____Do you think elementary, secondary, or K-12 principals are more likely to continue charting?

Estimate the number reporting from each category who continue to chart:

_____elementary (8 reporting)

_____secondary(grades 7-12) (3 reporting)

_____K - 12 (4 reporting)

3. Of the principals who continue to chart, estimate a number who maintain: instructional charts, management charts and personal administrative charts.

_____instructional charts

_____management charts

_____personal administrative charts

4. Estimate the number of principals who continue charting (15 reporting totally) who were initially trained in Precision Teaching while a :

_____Teacher

_____Principal

_____Student

_____Other

5. Estimate the number of Precision Principals who do not continue charting who were trained while a:

_____Teacher

_____Principal

_____Student

_____Other

6. Of the Precision Principals who have not continued to chart, estimate a number from this group who gave the following reasons:

_____not enough time

_____lack of funds

_____no interest

_____lack of support from others

_____other

7. Of the Precision Principals who continue to chart, what number responded that they were rewarded by their superiors, ignored by their superiors and punished by their superiors:

____rewarded

____ignored

____punished

Of the Precision Principals who do not continue to chart, what number responded that they were rewarded by their superiors, ignored by their superiors and punished by their superiors:

____rewarded

____ignored

____punished

Of the Precision Principals who continue to chart, estimate the number who reported they were rewarded by their immediate family members, ignored by their immediate family members, or punished by their immediate family members:

____rewarded

____ignored

____punished

Of the Precision Principals who have not continued to chart, estimate the number who reported that they were rewarded by their immediate family members, ignored by their immediate family members or punished by their immediate family members:

____rewarded

____ignored

____punished

8. The 15 Precision Principals were asked to estimate the average building-wide weekly correct acceleration in their building. Estimate the number of Precison Principals who continue to chart who reported:

___X1 ___X1.1 ___X1.25 ___X1.4 ___X2 ___X4

___X16

Estimate the number of Precision Principals who do not continue to chart who reported:

___X1 ___X1.1 ___X1.25 ___1.4 ___X2 ___X4

___X16

The 15 Precision Principals were asked to estimate the average building-wide weekly decelation in their building. Estimate the number of Precision Principals who continue to chart who reported:

___/16 ___/4 ___/2 ___/1.4 ___/1.25 ___/1.1

___/1

Estimate the number of Precison Principals who do not continue to chart who reported:

___/16 ___/4 ___/2 ___1.4 ___/1.25 ___/1.1

___/1

9. Feelings:

Precision Principals were asked to describe their feelings about various aspects of charting.

Of the 15 Precision Principals, how many reported positive feelings and how many reported negative feelings when asked how they felt others react when they first learn about Precision Teaching:

____positive

____negative

10. Chart-Based School

All 15 Precision Principals were asked how they would feel if they could have a chart decision-based school, comparted to how they feel now. Estimate the number of Precision Principals who continue to chart who reported feeling:

___same X1 ___2X better ___5X better

___10X better ___20X better ___50X better

___100X better ___/2 as good ___/5 as good

___/10 as good ____/20 as good ___/50 as good

___/100 as good

Estimate the number of Precision Principals who do not continue to chart who reported feeling::

___same X1 ___2X better ___5X better

___10X better ___20X better ___50X better

___100X better ___/2 as good ___/5 as good

___/10 as good ___/20 as good ___/50 as good

___/100 as good

The 15 Precision Principals were asked to estimate the average building-wide weekly acceleration if they could have a Precision Teaching program building-wide. Estimate the number of Precision Principals who continue to chart who reported:

___/100 ___/50 ___/20 ___/10 ___/5 ___/2

___X1 ___X2 ___X5 ___X10 ___X20 ___X50

___X100

Estimate the number of Precision Pricipals who do not continue to chart who reported:

___/100 ___/50 ___/20 ___/10 ___/5 ___/2

___X1 ___X2 ___X5 ___X10 ___X20 ___X50

___X100

The 15 Precision Principals were asked to estimate how much the total amount of content learned per year would increase if they could have a Precision Teaching program building-wide. Estimate the number of Precision Principals who continue to chart who reported:

___</100 ___/100 ___/50 ___/20 ___/10 ___/5

___/2 ___x1 ___X2 ___X5 ___X10 ___X20 ___X50

___X100 ___>X100

Estimate the number of Precision Principals who do not continue to chart who reported:

___</100 ___/100 ___/50 ___/20 ___/10 ___/5

___/2 ___X1 ___X2 ___X5 ___X10 ___X20 ___X50

___X100 ___>X100

11. Future

The 15 Precision Principals were asked to estimate what they feel will be the acceleration of Precision Teaching in the next five years. Estimate the number of Precision Principals who continue to chart who reported:

___/16 ___/4 ___/2 ___/1.4 ___/1.25 ___/1.1

___X1 ___X1.1 ___X1.25 ___X1.4 ___X2 ___X4 ___X16

Estimate the number of Precision Principals who do not continue to chart who reported:

___/16 ___/4 ___/2 ___/1.4 ___/1.25 ___/1.1

___X1 ___X1.1 ___X1.25 ___X1.4 ___X2 ____ x4 ___X16

Estimate what you feel will be the acceleration of Precision Teaching in the next five years:

___/16 ___/4 ___/2 ___/1.4 ___/1.25___/1.1

___X1 ___X1.1 ___X1.25 ___X1.4 ___X2 ___X4 ___X16